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A CHANGED EMPHASIS FOR MUSIC EDUCATION

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CALIFORNIA SOCIETY OF SECONDARY EDUCATION

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CALIFORNIA JOURNAL
OF SECONDARY EDUCATION

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New Books

NEW tests and rating scales released by their publishers during recent months include the following that have been sent to the JOURNAL for review:

Instructional Tests in Electricity, by Benjamin C. Gruenberg and Ellsworth S. Obourn. World Book Company. Price, 16 cents each or $5.00 net per package of 50; 31 pages.

Instructional Tests in Machines, by Benjamin C. Gruenberg and Ellsworth S. Obourn. World Book Company. Price, 16 cents each or $5.00 net per package of 50; 35 pages.

Iowa Silent Reading Tests, by H. A. Greene, A. N. Jorgensen, and V. H. Kelley. World Book Company; 1943 (new edition).

Lee-Clark Arithmetic Fundamentals Survey Test—Form A (high school edition), by J. Murray Lee and Willis W. Clark. California Test Bureau, 5916 Hollywood Boulevard, Hollywood. Price, 1 to 24 copies, 15 cents each; 4 pages.

Maintenance Drills and Tests in Arithmetic (high school edition), by Dorris May Lee and J. Murray Lee. California Test Bureau, 5916 Hollywood Boulevard, Hollywood. Price, package of 25 tests with accessories, 50 cents; 7 pages.

The Rise of Our Free Nation, by Edna McGuire and Thomas B. Portwood. The Macmillan Company, 1943. Price, $1.88; 822 pages.

Wings for America, by Marshall Dunn and Lloyd N. Morrisett. "America at Work" series, World Book Company, 1943. Price, $1.00; 256 pages.

Publications recently received include the following in the social studies field:

The Deification of Lincoln, by Ira D. Cardiff. The Christopher Publishing House, Boston, Massachusetts, 1943. Price, $1.75; 89 pages.

Economics in Everyday Life, by Kennard E. Goodman and William L. Moore. Ginn and Company, 1943. Price, $2.00; 563 pages.

Education for International Freedom and Justice, by Ralph F. Strebel. The J. Richard Street Lecture for 1943, Syracuse University, 1943. Price, 50 cents; 32 pages.

Get Together, Americans, by Rachel Davis-Dubois. Harper & Brothers, 1943. Price, $1.75; 182 pages.

For high school students of Latin-American history, D. C. Heath and Company recommends

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CALIFORNIA JOURNAL
OF SECONDARY EDUCATION

Vol. 19 MAY, 1944 No. 4

Society's Publications Sell Well

PUBLICATIONS of the California Society of Secondary Education have sold unusually well during the current school year, many of them being entirely or almost sold out and others remaining only in limited quantities.

The supply of copies of the *California School Directory* for 1943-44 was exhausted almost before the publication was in print. More *Directories* were sold this year than ever before in the history of the Society. The next edition will not appear until next November or December.

Several copies of the JOURNAL symposium for October, "Education for California's Minority Groups," are still available, but only half a dozen copies of the November issue, containing the symposium, "The Schools and Delinquency," remain.

More copies of the January issue with its symposium on "What the Army and Navy Are Teaching Us About Visual Aids" were sold than of any issue in recent years. A limited number of copies of it are still on hand, however, as are some copies of the enlarged February-March number with the symposium entitled "The Army Specialized Training Program in the West."

Single copies of the JOURNAL sell at 50 cents each, but ten or more copies of any one issue will be sold at 35 cents each.

Los Angeles Charts Its Ideas About the Future

ONE of the most interesting efforts by an individual school system to plan for postwar education is that which the city schools of Los Angeles have made as a result of discussions based on the chart presented on the following pages. This chart was prepared and published May 1, 1943, and is reproduced here exactly as it first appeared. In some ways it is even more interesting now than it was when originally issued, for the passing of time has made it possible for us to check on the accuracy of nearly half of the predictions and thus to arrive at some estimate of how much confidence we can place in the remaining ones.

Superintendent Vierling Kersey writes with regard to the chart: "It was not prepared for general distribution nor for any other purpose than to have reference made to it at a meeting of principals of Los Angeles City Schools. At that meeting, held a number of months ago, the chart was presented. Since that time the recommendations in the column, School Musts, have been interpreted and integrated into activities in individual schools. We are happy that a good many of the statements in the chart were correct prognostications."

The chart is presented here not only because of the interest which readers will have in the predictions it contains, but also because of the planning technique which it illustrates:

July 1, 1943

The War	*Washington*	*Production*	*Employment*	*Income*
Russian advances continue with success. African victory determined. Effective blitzes on Italy and Germany. Actual European invasion on the way.	Increased rationing. Tighter controls and price setting. Permanent ways of meeting wants are determined—food, clothing, housing, transportation.	All production is geared to war first. Union of business, industry, labor, and farm enterprise with war needs as basis.	In 1943 total population 63,000,000. Workers producing civilian goods 26,500,000. Workers producing war needs 27,500,000. Armed forces 9,000,000.	In 1943 annual income 135 billion. Annual savings 35 billion. Total cumulative savings or purchasing power 150 billion.

January 1, 1944

Stalemate further Jap attempts to advance. Effective aid to China. American Military starts occupation of conquered territory. Successful Allied attack on Burma. Germany weakens internally. Surprises on Japan which are truly offense.	World feeding and clothing plans set up. Taxes revised and pay-as-you-go plan set. Unification of Allies on responsibility to do world job of social advancement. New war contracts for pre-determined war and naval strength for the future.	War production goes on an efficiency basis—cost-plus going out. Labor dislocations begin to end. Industrial re-conversion for peace begins. Devices to promote, preserve, develop, and experiment with new inventive genius coming out of war—all determined and a start is made.	In 1944 total population 63,000,000. Workers producing civilian goods 36,500,000. Workers producing war needs 17,000,000. Armed forces 9,500,000. Serious consideration required to decide whether armed forces should go to 13,000,000. This question one of most difficult to project.	In 1944 annual income 135 billion. Annual savings 32 billion. Total cumulative savings or purchasing power 182 billion.

January 1, 1945

Allied bases in China set. Series of irregular Allied successes, mainly Pacific. Greatest casualties during last six months of 1943 and first six months of 1944. Fight for victory over Japan now begins, no collapse there. United States help to Allies and policing becomes reality. Release of 500,000 men per month begins. Forces stay at approximately 4,000,000 as permanent armed strength.	The United States security plan takes shape. United effort with labor and farm groups united. Acceptance of 15–20 per cent inflation. Complete postwar planning, jobs for all, no "over-supply." Government control of materials, quantities, standards, and uses. Possible party change in national politics or a new party out of an old one.	Business and industry begin to set quotas on basis of returning military men. Plan place of women in production of future. Settle free enterprise, collective bargaining, and labor relationships for a period of years. Security for all and problem of having all deserve it, arises.	In 1945 total population 58,000,000. Workers producing civilian goods 49,000,000. Workers producing war needs 5,000,000. Armed forces by July, 1945, 4,000,000. New booms in employment in industry to produce goods to make up for war slack in manufacturing. The world's greatest advance through aviation begins. Workers for production more demanded than war release of workers will satisfy.	In 1945 annual income 130 billion. Annual savings 13 billion. Total cumulative savings or purchasing power 195 billion. Savings become purchasing power for postwar period. Savings begin to be converted into goods, land movement, private and public old-age security plans.

May Happen and When

July 1, 1943

Science	*Ideas*	*Values*	*School Musts*
War stimulates new discoveries to be available in materials and processes in peacetime.	Will government or the businessman handle business questions? Who will control industry—government or industry?	More hoarding of goods which people think are to be rationed.	Guidance instruction early, decisions in junior high school, some teaching born out of guidance offered begins at once. Re-examine guidance with a view to: a. Centralizing leadership and decentralizing operation. b. Make specifics apparent, not a generous succession of generalities. c. Many contact guidance influences provided are best. d. Guidance is now only 10 per cent school-centered information and 90 per cent is out-of-school constantly changing fact and interpretation.

January 1, 1944

United States becomes self-sufficient in most needs for materials Mechanics, transportation, housing, clothing, and packaging are re-designed. New power, fuels, and engines are developed.	Where is the place of private responsibility in the social front—the nursery child, juvenile crime, free mobility for those who are not thrifty? War thinking will be emphasized by the casualty lists and returned boys.	War slogans become ideals. A wave of serious sincerity comes over the people. A good name and reputation again become important. "Our brother's keeper" idea approaches reality in a national way.	Make the schools reflect the good things the boys and the country find in the military. Give youth responsibility, not only opportunity in a unit of a working democracy. Determine the continuing aspects of the present war-time period which can and should become permanent. Give every child a war job. Relate all teaching to a war motive. Every school youth becomes part of available labor pool. Every school child becomes a producer and every school a production center. The school will direct plan to use youth or else industry or government will. Break into the "sacred time cubicles," "semester," "period," "5 times a week," "spread over a term, year, or 2 years." Find out what has to be learned, how much child must grow and then "grow him" as well as let him develop. The assumed relationship between scholarship and morality must give way to a true contributory effort toward high grade morality.

January 1, 1945

Public gets in on science and education for postwar living. Control of new developments by the government needed so that balance prevails. Research becomes an "everyman" activity. Relocation of industry is planned. We make the gadgets and items for higher standard of living for the world. Basic scientific knowledge for living, production, and transportation is required.	Public becomes sober, serious, emotional, and religious. Public is ready to jump at fantastic schemes. Public will be receptive to new production and new living, but will need great leadership. The individual becomes all-important. Greatly imposed savings cause the individual to become a greater power. People seek a new start in life. They get away from war and troubles of depression and war days.	Values in people, not in goods, come forward. The spiritual becomes the best practical plan. Social values, as planned by the socially idealistic, should be only for the worthy. True morality and integrity in practice demanded. An era of ethical idealism becomes current in our philosophy.	Think about pre-habilitation of those not in war for peacetime and rehabilitation of those in war for peacetime. Educational purposes and goals become specific and standards become exact. We may not like it, may not be ready for it, but the core of knowledge to be tested is to be fundamental skills to a new high, and spelling, geography, history, science, and citizenship to a well-determined accomplishment. Devices, ways, courses, and offerings, dealing with a more well-developed hand power, dexterity, and ability, are expected. Doing several semi-skilled activities with better than average success. Hobbies turn from merely collecting to making. What can your school do now that will certainly serve postwar time? The constants the war has given us. Get the spiritual ideals to the front—music, literature, art, industrial art, drama, etc.—on a new "culture-for-all-basis." Emphasize and interpret what we were in war for as a basis for peacetime education objectives. Have facts as well as adjectives. Doing more and better faster. That will be new "American Way."

Till Next October

THIS being the last issue of the JOURNAL for the present school year, we leave you with best wishes for a pleasant and profitable summer. Publication of the magazine will be resumed next October.

Plans for next fall's JOURNAL already are taking shape. It is anticipated that the opening symposium for the year will be an up-to-date report on preflight aeronautics. One fall issue probably will contain a symposium discussing the place of the arts in the war-time curriculum.

The financial condition of the JOURNAL is much improved over what it was this time last year, so the next school year should see a resumption of the monograph series, which has been suspended temporarily for the past year.

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45 Schools Participate in the Group Subscription Plan

AT the close of the school year 1943-44, forty-five schools have group subscriptions for the CALIFORNIA JOURNAL OF SECONDARY EDUCATION. This means that nearly 800 teachers are receiving their copies of the JOURNAL at the bargain price of $1.00 per year.

The only requirements for a school to participate in the group subscription plan are that it must have an Institutional Membership in the California Society of Secondary Education (the spending of school district funds for this membership is authorized by the State Board of Education) and that one-third of its faculty members are entered as subscribers.

Group subscriptions can be started at any time during the year.

The following are the schools having group subscriptions as of May, 1944:

Alameda High School.
Antelope Valley Joint Union High School, Lancaster.
Arcata Union High School.
Central Junior High School.
Citrus Union High School and Junior College, Azusa.
Colusa Union High School.
Corning Union High School.
Delano Joint Union High School.
East Bakersfield High School, Bakersfield.
El Monte Union High School.
Fall River Joint Union High School, McArthur.
Fremont Senior High School, Oakland.
Fresno State College.
Gonzales Union High School.
Glenn County High School, Willows.
Hoopa Valley High School.
John Burroughs Junior High School, Burbank.
Julian Union High School.
Kern County Union High School, Bakersfield.
Kernville Junior High School.
Lassen Union High School and Junior College, Susanville.
Laton Joint Union High School.
McFarland High School.
Madera Union High School.
Merritt Business School, Oakland.
Monrovia-Arcadia-Duarte High School, Monrovia.
Southwest Junior High School, Nestor.
Oakland Junior-Senior High School.
Oxnard Union High School.
Pacific Grove High School.
Polytechnic High School, San Francisco.
Princeton Joint Union High School.
Ralph Waldo Emerson Junior High School, West Los Angeles.
Red Bluff Union High School.
San Pedro High School.
Santa Barbara High School.
Sequoia Union High School, Redwood City.
Schneider Vocational School, Stockton.
Shasta Union High School, Redding.
Strathmore Union High School.
South Pasadena-San Marino Senior High School, South Pasadena.
Taft Union High School.
Tranquillity Union High School.
Westwood Junior-Senior High School.
Woodrow Wilson High School, Long Beach.

In-Service Education for an Entire State

By VERNON E. ANDERSON

A most interesting program of curriculum study and in-service training is being carried on in the State of Washington. Under this plan, the teacher-training institutions of the State assume responsibility for in-service training programs in various cities, there being such obvious advantages in this plan as the following: local schools secure the assistance of experts in the solution of curriculum and other problems; teachers at home in their normal teaching environment receive the professional training they had to take previously in summer school; through this means a statewide program of curriculum improvement is being conducted; both college professors and local teachers profit from the opportunity to work together in the solution of existing educational problems.

Dr. Anderson, who writes this article, is curriculum director and junior college supervisor in the State Office of Public Instruction, Olympia, Washington. He also is chairman of the State In-Service Training Committee and has responsibility for the administration of the in-service program from the State Office. Before assuming his present position, Dr. Anderson was an assistant in education in the College of Education, Boulder, Colorado, and served as an instructor in the University of Colorado summer school.

THE records of American education show that ever since the improvement of instruction became one of the foremost concerns of the schools outstanding school systems have provided some organized form of in-service training for teachers. These schools have added supervisors and directors of instruction and curriculum to their staffs, have conducted planned supervisory and curriculum improvement programs with teacher participation in planning and execution, have sponsored professional reading clubs, extension classes, and conferences, have participated in special studies and used the services of consultants. Generally, however, the schools which have provided special services for continued teacher education in service have been limited in number.

The Washington State program of in-service training is but one of many projects for this type of continued organized professional education of teachers. It endeavors to furnish an impetus to schools to carry on their own in-service programs and supplements rather than supplants the work already being done. It represents, however, the most extensive experiment of its kind in bringing the instructors from teacher-training institutions to the schools to continue the process of education in the natural laboratory, the classroom—an extension of teacher education, statewide in scope.

In that the program had no precedents to follow; it is experimental in nature. Sponsored by the State Board of Education, its participating agencies are the five state teacher-training institutions and the State Office of Public Instruction. The teacher-training institutions are coöperating to furnish this service to the State under the direction

of the State Office as the coördinating and organizing agency. Included are the University of Washington, the State College of Washington, and the Eastern, Central, and Western Colleges of Education.

IN October of 1942, the state superintendent of public instruction formally presented to the State Board of Education the matter of in-service training of teachers. At that time, a recommendation was made that the state superintendent call a conference of the state institutions of higher learning to develop a plan. The conference selected a committee to prepare the details of the plan, and, before the end of the year, the State Board of Education had accepted the report and set into motion a survey to determine the areas in which the interest was greatest in in-service training and appointed a permanent state committee representing the higher institutions and the Office.

Teachers were asked to indicate whether they would be interested in participating in such a program of classes, conferences, and special services if it were available in or near their schools and what type of study arrangement they preferred. The questionnaires were distributed by the State Office.

Further study of the details of the plan and the results of the survey were made by the state committee during the winter quarter. An appropriation of $15,000 was secured from the state legislature for payment of traveling and maintenance expenses of instructors while participating in the program and for other expenses of administration. In March, 1943, the final plan was approved by the State Board, establishing uniform policies for all the institutions, and the program got under way at the beginning of the spring quarter.

THE program has passed through a series of evolutionary stages since it was first proposed. The number of teachers returning to the profession after several years out of touch with teaching, the retraining of teachers for new fields necessitated by the teacher shortage, the curtailment of summer school enrollments, and the decreased college enrollments undoubtedly were all war-time conditions which gave an impetus to the establishment of the plan. The first bulletin describing the program, published by the State Office of Public Instruction, contained this statement of purpose:

> The in-service training program is provided as a service by the public institutions of higher learning to the schools of the State for the refresher training of teachers returning to the profession during the war period, retraining of teachers for new subject fields and general professional advancement. The number of teachers who hold war emergency certificates is increasing, and many new demands are being placed upon the public schools. Adjustments are being made through the introduction of new courses and modification of existing courses. At the same time, summer school attendance will be curtailed because of the necessity for teachers to work in war industries and in agriculture during the vacation period.

Although this service has been available to all teachers since its inception, its value for all teachers rather than just for those holding war emergency certificates has been stressed more as the plan has developed. Experience has shown that teachers with many years of continuous experience and excellent training have participated with a great amount of interest. All agencies participating now stress it as a service to all teachers in the state and agree that it is a desirable long-range program.

IN the coöperative plan, the function of the State Office of Public Instruction is to serve as the agency of administration and coördination. It has the responsibility for making the serv-

ice known to the schools of the state, determining the areas where the program is to be conducted, coördinating the work of the participating institutions, and administering the general provisions of the plan. Payment of expenses for the instructors' maintenance and traveling is made by the Office, which is charged with expenditure of the funds appropriated for that purpose.

The teacher-training institutions provide the actual instruction in the field as a service to the schools of the state. Neither the institution nor the instructors receive any extra compensation for the in-service work. The original plan called for staff members to be placed on full-time service for the program, but experience has shown that it is preferable to place staff members in the field for a week's to a quarter's length of time.

These regular in-service staff members, who ordinarily have charge of campus classes as well, are selected, according to the State Board's recommendations, from the staff in the field of education on the basis of familiarity with both subject matter and techniques and teaching experience at the particular level. They are supplemented by others from the subject matter fields who are scheduled in schools according to requests received. The plan also provides for the use of competent public school instructors to assist as consultants on the program.

Close coördination in the development of the work is achieved through the state in-service training committee, composed of representatives of the institutions and the Office, which meets approximately once a quarter to consider general policies and desirable methods of procedure.

The general division of responsibility for teacher training which exists in the State of Washington is followed in the in-service plan, the three Colleges of Education providing the services for elementary teachers, and the University and State College for secondary teachers.

A zoning plan which divides the state into areas to be served by the institutions at each of the two levels aids in keeping travel at a minimum and facilitates the general administration. Within its particular zone an institution serves a block of territory for a six weeks' period. Usually such an area consists of one or more counties, this depending on the size and number of school systems. Smaller, more isolated counties may be scheduled for a shorter length of time. Under this plan, on the average of four areas can be served within a school year, since the first and last few weeks of school and certain other periods, at the request of the schools, have not been included in the schedules.

No charge is made for the program to the school or the teacher.

WHEN a school desires to use this plan for the professional advancement of its staff, an application is made to the state superintendent of public instruction. Ordinarily the application is made through the county superintendent's office as the logical coördinating agency to survey the interests in the county and send in the composite application for all schools interested.

Upon receiving an indication of this interest on the part of the schools of a county, the State Office calls a preliminary organization meeting of school administrators and representative teachers in the area to discuss with them the possibilities of the program, how it might best function to serve the schools in the area, whether the elementary or secondary program is desired, and the information needed from the teachers as to the type of assistance desired. The next step is the assignment of the area to the institution at some time available in the schedule. It has been the general

practice to have only one institution serving a particular area at any one time.

When the institution receives its assignment, it goes ahead with the organization on the plan in accord with the wishes of the schools in the area.

SINCE the program is experimental in nature, aimed to be of the greatest possible service to the schools of the state, the plan of functioning has differed in various areas. The size of a county, the distance between schools, and the type of assistance desired are all varying factors which have made it desirable to keep the plan flexible.

In some areas certain larger school systems have been designated as centers. One or more instructors may be assigned to a center for a week's time, serving the outlying schools as well. Group conferences are held in the center on scheduled evenings during the week, teachers from nearby schools also attending these meetings. Another plan used has called for three or four centers in the county at which after-school or evening meetings were held once or twice a week for the entire six weeks' period.

A clinic and individual school conference plan was used in one county which was particularly interested in having a clinic in language arts conducted at one of the larger centers one evening a week during the period of in-service work assigned to the county. Most popular with teachers and administrators have been the individual school conference and visitation plan, whereby the instructors are scheduled to work in a school system for a period of from one to several days. In each of the plans described above, however, the instructors have visited the individual schools.

This last fall, in a few school systems where the high schools did not open until a number of weeks after the elementary schools, because of the shortage of labor in the community, a preschool conference was conducted for the high school teachers. During the week before classes began, the high school teachers spent the full time in planning and organizing their courses and materials for the year with the assistance of in-service instructors and local school administrators.

Class visitation during the day, supplemented by individual conferences, has been found one of the most successful ways for instructors to work with the teachers and to become acquainted with their problems. During these visitation periods, the instructor learns what type of pupils are in the class, the kind of materials with which the teacher has to work, and observes the general teaching situation. Stress is placed on the fact that the instructor is there to assist the teacher and not to evaluate her work or to make any reports to other authorities.

Any fear of evaluation is soon dispelled when the instructor works with the teacher. There are well-selected opportunities for individual conferences during the day, demonstration of procedures, reference to materials, suggestions for room environment, and assistance in solving specific problems. Materials are brought along and their use discussed. Bibliographies and outlines are furnished.

These contacts during the day provide an invaluable basis for discussion in small group and building meetings after school and in the evening. General conferences involving a number of schools furnish an opportunity for exchange of ideas between schools.

Follow-up work during the year, especially in schools where a program of local in-service work has been stimulated, is provided for on a more limited basis than the original program.

Although the workshop-center type

of plan makes it possible for teachers to earn two quarter credits during the six weeks' period, little interest has been shown by teachers in earning credits. Credit is arranged with the coöperating institution on an extension basis and includes the payment of the regular extension fee.

THE program, which is one that school people in the state had long desired as a permanent means to improved teacher education, has been received generally with enthusiasm and appreciation. Comments from participating schools by individual teachers and county and city superintendents, comments by instructors in the teacher-training institutions, increased use of work type conferences and local curriculum programs, the establishment in several counties of in-service programs sponsored by the office of the county superintendent of schools—all attest to that fact.

Constant experience with new situations in different counties has revealed need for improvement. The plan is, frankly, experimental and does not have all the final answers to continued teacher education in the field, but almost a year's experience has indicated many ways by which the program can be most effectively conducted. These general conclusions have been reached:

1. Sufficient time must be devoted to the program in a particular school to make the most effective use of the in-service instructors. Initial visits are best followed by a second visit during a six-week period.

2. The office of the county superintendent is an important factor in the success of the program. County superintendents have assisted materially in forwarding this service.

3. Schools in which some organized type of supervisory or curriculum program is being conducted receive more benefit from the program than where there is no continuous study of local professional problems.

4. Knowledge of how the program can function to assist the schools is an important factor in determining whether a county will make an application for the service. Areas where the program had been conducted at the one level were the first to apply for it at the other level.

5. Administrators and instructors from the teacher-training institutions agree that the work has been of a great deal of benefit to them though providing contact for instructors with the realistic situations which exist.

6. Patterns of most effective methods of procedure are evolving; for example, classroom visitation has proved popular and worth while.

7. Before any program is begun, adequate preliminary planning needs to be done:

(*a*) By the institution through studying the area to gather information about such factors as teaching load, building facilities, instructional aids, training of teachers, working philosophy of the school, and problems that need to be analyzed.

(*b*) By the schools through discussions with staff members and local planning to make the most effective use of the service.

8. Better results are achieved when emphasis is placed on methods, curriculum organization, testing, and instructional aids as related to subject matter rather than on subject matter alone.

9. Where administrators actually participate in the program through preplanning, attending meetings, assistance to the instructors, and evaluation, there is a greater chance of continuous professional study in that school.

10. Some continuity needs to be given to the program through more than one visit to the school during the period, the use of a coördinator, or general group meetings in convenient centers.

11. It is of advantage to concentrate on one or two phases in which the school is particularly interested.

At the time of this writing there are still several counties left to be served in the State during the present school year. The program will be continued next fall in new areas and with follow-up in areas already served. To many who are participating, the plan has implications for an extended scope of teacher education in years to come.

Educational Lessons from The Air Force

By THOMAS H. GREER

THE thousands of young Americans now flying over Axis lands are the products of our public schools. These men received their basic education in thousands of places, small and large, from Maine to California. Yet all of them had one school in common—their "finishing school" in the Army Air Forces. Victories in combat show what these schools have done.

The Air Force schools are themselves the product of American educational experience. Teaching methods which proved successful in public education have been adopted as standard practices in Army training. Hundreds of civilian instructors have been taken into the service and assigned to teaching duties. Now the Air Force schools are having the opportunity to repay in part for their educational inheritance. They can repay in terms of lessons learned which apply to the public schools.

There is, of course, no such thing as "Army" education, or "Air Force" education. Certain conditions peculiar to a military régime exist in all Army schools, but individual training programs may differ as night from day. The present writer has had close association with only a few Army schools. The lessons suggested here come from one in particular—one of the largest in the Air Force. They are not "Army" lessons. They are facts growing out of a vital educational experience.

THE educational experience at this Air Force School has been conditioned by its military setting and purpose. The aim of the school is to prepare aviation cadets for subsequent flight training. This preparation consists of an intensive two months' course of academic, military, and physical training. Academic classes are held four or five hours daily. The entire twenty-four hours of each day are under strict military control.

The course of study consists of the "fundamentals"—subjects the men should master before starting to fly and navigate. In addition to basic military subjects, these include mathematics, physics, maps and charts, radio code, and identification of aircraft and naval vessels. All courses are relatively short and cover only aspects relating to military aviation. Direction and execution of the academic program has been entrusted largely to professional educators, who were commissioned directly by the Army or employed as civilian instructors. Although subject outlines generally were fixed by directive from higher authority, these "Army civilians" have had much freedom in developing administrative and teaching techniques.

What is the relationship of this highly specialized program to public education? Little, perhaps, at first glance. Closer observation, however, reveals that the two programs have many fundamental problems in common. Experience at this Air Force school, where thousands of students are dealt with each month, has been in fact a proving ground for educational policies. The results have significant implications for the public schools.

All of the lessons learned cannot be applied directly to civilian education. The objective of the pilot training program is relatively narrow. It aims to

develop skilled officer-pilots who can lead their crews against the enemy. The objective of civilian education is the broadest possible development of the individual as a useful member of society.

In spite of the difference in purpose, the Air Force school, like the public school, is concerned with the "fundamentals." Before cadets may proceed to more specialized training they must be well grounded in basic mathematical operations, verbal and written expression, and fundamental physical, geographical, and biological concepts. Such a preparation seems highly advisable for all our youth. Those in the Air Force who lack it cannot proceed with air crew training. Those in the public schools who lack it cannot proceed effectively with the complicated problems of modern living.

THE Air Force school has found that it is futile to teach masses of detailed information. *Best results have been obtained where the fundamentals of a problem have been explained and stressed—then mastered by the student. The Air Force experience suggests that in the public schools the curriculum always should be concerned with the large, basic, simple facts and operations.* Such materials should be presented on each educational level in terms of the maturity level of the students. The "fundamentals," of course, in public

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Nearly six months ago, a beginning was made on a symposium for the "Journal" that was to be entitled "What Our Schools Can Learn From the Services." Members of the Editorial Board were asked to recommend former California secondary school personnel now in the Services who would be qualified to interpret the implications of Service educational experience for our public schools. On the basis of these replies, thirty-five men and women, each representing a different branch of the Service, were invited to contribute articles for the symposium. A few of these people were never reached, and some of them stated that their present duties are too arduous or of such a nature that at the moment they are unable to write for publication. A great number, however, agreed to furnish manuscripts.

As the deadline for the symposium came and went, only four articles arrived. Several persons who had promised to contribute had been assigned new duties or had been shipped overseas and so were unable to prepare their articles. A great many others found they could not get their manuscripts cleared for publication, at least not in time to make the deadline, and so were unable to submit their manuscripts even though they had been completed.

And so the symposium goes to print containing only four articles, authors of which are Lt. Thomas H. Greer of the Air Corps; Captain John Lombardi, director of ground school training for the 37th Flying Training Wing; Lt. (j. g.) Alice Dement of the Standards and Curriculum Section, Training Division, Bureau of Naval Personnel, Navy Department, Washington, D. C.; and Lt. Col. Kenneth E. Oberholtzer of the United States Armed Forces Institute. The contribution of these four articles serves to indicate how valuable would have been the symposium had it appeared in full as originally planned.

Attention should be called to the article by W. T. Boyce which follows immediately after the symposium. It adds materially to the picture of the USAFI which is presented in the Oberholtzer article which precedes it.

As other articles which were to have been included in this symposium are cleared for publication, they will appear in later issues of the "Journal." The secondary schools of California have much to learn from the educational programs of the Armed Services and from the men and women who are participating in them.

education are broader than in the Army. They include, for example, civic training. The "fundamentals" of civic education are familiarity with the large facts of our history and present society and the development of desirable democratic attitudes.

Important lessons in constructing courses have been learned in this Air Force school. At first, in compliance with directives from higher authority, too much was crowded into course outlines. For example, in the subject of aircraft recognition, an early outline called for teaching a large number of planes in the space of a few hours. The speed of presentation was so great that all planes were "covered," but few were *learned*. Gradually, instructional time was lengthened, and the number of aircraft taught was cut in half! At present, the time allotted for the teaching of each plane is five times greater than when the program first started. But now the students achieve a high degree of proficiency in recognizing operational aircraft.

The amount of material included in a course outline should be governed by the nature of the subject and its relation to the student. If *mastery* is desired, the amount should be strictly limited. If *orientation* is desired, more material should be planned. *The subject matter, whether intensive or extensive, should be directed toward developing and reinforcing a relatively small number of basic skills or understandings.*

THE most successful course outlines have been constructed by the teachers themselves. When instruction first began at the Air Force school, outlines had to be drawn up hastily and handed down from above. For the most part they proved unsatisfactory. One department head soon led the way in organizing his instructors into a course-making committee. The revised outline, which all the instructors helped to create, proved far more satisfactory. What is equally important, the process of making the outline sharply stimulated teacher morale. The general nature of a course may well be specified by higher authority. *But the lesson outlines should be made by the instructors.* This method assures that the outlines will be sound from the teaching point of view and that they will be satisfactory to the instructors.

An interesting teaching technique was incorporated in these lesson outlines. Each hour's lesson emphasized three or four main points. The course was designed so that students would learn something definite and important *each hour*. Student morale and response were boosted by this type of lesson organization. It gave students a real sense of specific progress at the end of every class period.

A group of officers, many of them former California secondary school men, got together one night at one of the Air Force schools and summarized what they had learned from their experience in the school which would apply to public education. At the suggestion of Lt. H. C. Davis, formerly of the San Jose City Schools, Lieutenant Greer summed up the conclusions of that discussion in the form of the present article.

Lieutenant Greer, who has a Ph. D. degree from the University of California, was an instructor in Social Science at San Diego State College before he transferred to this Air Force school as a civilian instructor and supervisor in 1942. Shortly after being employed at the school, he enlisted in the Air Force and later was commissioned as a second lieutenant. He writes that "for reasons of security, the name of the school to which I am attached should not be published."

EMPHASIS upon student participation is another standard feature of instruction at the Air Force school. When teaching first started, it consisted of straight lecturing, with brief periods for working problems. Although a lot of material was "covered" in that manner, relatively little was *learned*. The supervisors, by means of special in-service training programs, developed the idea and methods of greater student participation. Instructors were encouraged to concentrate less on subject matter and more on the cadets. It was suggested that individual students be called upon, at least every five minutes, to answer a question or make a summary. This practice kept students "on their toes" and enabled the teacher to know if the material was being grasped. General acceptance of this principle by instructors has increased the effectiveness of teaching in every subject.

Many additional variations in teaching procedure have been developed to keep student attention at a high level. The course in identification of naval vessels, for example, provides special opportunities for this. Verbal presentations by the instructor are supplemented by the use of ship models, slides, photographs, silhouettes, and blackboard drawings. All of these techniques are normally employed during each hour of instruction. In every subject a continuous effort is made to develop new and effective ways to vary procedures.

Maximum student attention is further sustained by insistence upon good posture in the classroom. It was recognized early in the history of the school that when a student slumps down in his seat he is preparing for physical and mental slumber. Keeping the body alert helps to keep the mind awake. Students are required to sit up and keep both feet flat on the floor. While the principal method for maintaining student attention is through developing interest and purpose, the learning situation is strengthened by such physical requirements.

It has proved most effective also to require students to stand while reciting. This procedure is not a handicap to student participation once it becomes a habit. On the contrary, the practice has a stimulating effect. It gives students experience in expressing themselves on their feet and insures that the rest of the class hears whatever is said.

Results in the Air Force school point to the importance of the physical aspects of the learning situation. The public schools should profit from this experience.

OBSERVERS of the pilot training program are impressed by the high degree of earnestness and motivation shown by students. The cadets proudly call themselves "eager." It is hardly to be hoped that motivation in peace-time civilian education can equal this. Cadets can see readily that what they learn is associated with what they will need in the very near future, and it is far more difficult to show specific applications of subject matter to the actual problems of peace-time youth.

The Air Force school, however, has not taken motivation for granted. Devices that are sound in any educational program have been developed and stressed. The opening minutes of each hour's lesson are devoted to the "reason why" for the subject to be presented. At the end of each hour a summary is made of the main points learned. This arrangement makes for a definite sense of progress in a significant direction. *Most minds will be "eager" if they know they are going some place.*

The "positive" factors in motivation are supplemented by so-called "negative" spurs. The cadet applies himself not only because he understands the value of what he studies, but also be-

cause he fears the possibility of elimination. He does not want to become a "wash-out." If, in spite of all this drive to succeed, a cadet is inattentive or lazy, he can be compelled to attend night study halls for subjects in which he is deficient. *The experience of the Air Force school has been that a man may learn even under "compulsion."* It is not the best way to learn and is regarded as a last resort; however, it should not be dismissed as an unworkable technique.

In what ways may the public schools apply these principles of motivation? They are already doing much to develop interest and purpose, but they can do more. It is not enough to tell students at the start of a course why that course is useful. *The reason for learning a certain subject should be incorporated in every day's lesson.*

Since the public schools cannot apply "pressure" through the power to eliminate academic delinquents, other "ulterior" factors may be used to advantage by the schools. For example, the customary rule requiring athletes to maintain a minimum scholastic standing is a stimulus to the nonacademic-minded. Thousands of young men learned the little they "had to" as a means of playing football or basketball. Establishment of awards and privileges for scholastic success is another "ulterior" device which should be thoroughly explored. The schools at the same time could well afford to experiment with various kinds of penalties, within the scope of their authority, for those who fail to make a reasonable effort.

The use of such "negative" devices may be repugnant to some educators. Indeed, they must be carefully and wisely administered. But if these methods are an aid in educating our youth, they should be used.

The military atmosphere of classrooms in the Air Force school is naturally absent in civilian education. In the public schools there is no clicking of heels, about faces, and forward marches. The public schools rightly emphasize self-discipline and individual good behavior. Education doubtless would benefit, however, if some of the discipline and courtesy of the Air Force could be carried over to the public schools. Arrival in class on time, strict observance of classroom regulations, and respect for instructors seem a reasonable minimum to expect of students. Emphasis upon courtesy and respect is especially important. It develops desirable social habits and at the same time aids learning. Efficiency in learning improved noticeably in the Air Force school when the civilian instructors became officers. The respect for officers inculcated in the cadets was transferred to their teachers. *And the greater the respect for their teachers, the more the students learn.*

TESTING in the Air Force school was at first unsatisfactory. Each instructor made his own tests. Some were sound and some were weak. One department head soon showed the way by setting up a test committee of instructors. All teachers submitted proposed questions to the committee, and the committee set up trial tests. After repeated use, ambiguous questions were eliminated, and the proved test forms were made standard for members of the department.

The test committees now function in all departments under supervision of a central testing expert. Old forms are revised continually and new forms are constructed. This technique of test-making is considered highly desirable. The teachers themselves generally are best qualified to make up test questions. Coördination and analysis can be done best by testing experts.

Comparison of standard examination scores by the students of various instructors within a department is a useful means of measuring the relative effectiveness of teachers. It certainly is not the sole measure of a teacher's work. If the students of one instructor are consistently low on examinations, however, that is an indication of weakness. In such cases the instructor himself usually reëxamines his procedures and improves his teaching. Frequent administration of standard examinations in a city school system deserves careful consideration.

THE capstone of the academic program in the Air Force school is its system of supervision. It has made possible the welding of fine individual teachers into an educational team. At first many instructors, especially those who formerly taught in colleges or universities, balked at the idea of supervision. This resistance was overcome gradually as the supervisors stressed that their main purpose was to *help*, not to *inspect*. Every "visit" by a supervisor is for at least a full teaching period, and it is *always* followed by a conference with the instructor. This assures the instructor an ample opportunity to demonstrate his work. It allows him to know what the supervisor thinks about his teaching and to profit from suggestions that may be given.

No system of supervision is effective if the supervisors are not qualified. They must have acquaintance with subject matter, thorough knowledge of teaching principles, and a balanced personality. *Supervision by unqualified individuals tends to destroy teacher morale.* Supervision has produced excellent results in the Air Force school. Every instructor has shown improvement under supervision. This improvement has resulted from professional advice and from knowledge that the teaching job is being watched and appreciated. *The normal individual raises his performance when his efforts are being noticed.*

THE war has driven home many hard facts. A modern Army and Air Force must have trained men. We have stopped at nothing in order to give them the best training in the world. Why should we do less in educating youth for democracy?

University Takes Over Santa Barbara State College

Santa Barbara State College will be incorporated into the University of California, under the name of Santa Barbara College, on July 1, 1944, and plans are being made to maintain and improve the College so that it may, like other parts of the University, be an institution of which the people of California can be justly proud—announces President Robert G. Sproul.

In taking this action, he indicated, the Regents of the University of California are carrying out the terms of the act passed by the 1943 Legislature, and signed by Governor Earl Warren on June 8, 1943, whereby Santa Barbara State College was abolished and the Regents were authorized to establish, within a period of two years, a branch of the University in its stead.

Santa Barbara College will not be patterened exactly after any other unit of the University but will express its own individuality and have its own admission requirements, which will go into effect on July 1, 1945, President Sproul revealed. In the meantime, the present entrance requirement will be maintained.

The College will continue as a four-year, undergraduate institution, offering, for the present, work leading both to the Bachelor of Arts degree and general teaching credentials and to the degree of Bachelor of Applied Science for students specializing in Industrial Arts, Home Economics, Art, Music, and Physical Education.

Service Schools Teach Us Many Lessons

By JOHN LOMBARDI

THE vast educational systems developed by each of the Armed Services and their branches will have far-reaching repercussions on our schools in the postwar era. All of these educational systems are manned in part by officers and enlisted men who were educators in civilian life. When these men return to their civilian status, they will carry with them concepts of education which will appear strange to their colleagues who were forced to remain on the home front. The students in these schools likewise will exert an influence on the postwar educational system.

The following paragraphs discuss certain phases of the Service training programs which are likely to influence educational procedures in our postwar schools.

Basing his discussion largely on his experience with the Air Corps' pilot ground school educational system, Captain Lombardi discusses the differences between Service training and the work of our regular schools. From his article we gather the general impression that the one big way in which Service war-time schools surpass civilian schools is in their avoidance of stratification and their remaining sensitive to the need for change.

Captain Lombardi is assistant air inspector of ground training for the 35th Flying Training Wing, with headquarters at Minter Field, California. He is on leave from his position as instructor in mathematics and science in the Los Angeles City College.

THESE Service schools have definite specific objectives. Each school is organized to accomplish some particular mission, be it to make soldiers out of recruits, officers out of selected civilian or military personnel, or pilots out of the cream of our youth. The schools may be permanent, such as pilot schools, or temporary such as the Air Forces Officers' Training School at Miami Beach, which was discontinued as soon as its objective, the training of officers from civilian life, had been accomplished.

Because each school has a definite objective or mission to accomplish, its curriculum will reflect the same tendency. Every subject will, in fact *must*, contribute to this end. Curriculum research, often based on reports from the theaters of operation, is constantly in progress. Courses are rarely static; improvements are made frequently. For instance, the ground school curriculum of the Air Forces pilot schools has undergone two major changes and many minor changes in the last fourteen months. The individual courses in the pilot schools have shown steady refinements accompanied by the elimination of unnecessary materials.

An example of a rational approach to an educational problem was the manner in which the Air Forces and also the Navy pilot schools radically revised their methods of teaching aircraft and naval recognition. Dissatisfied with the method being used at the time, the military leaders turned to Dr. Samuel Renshaw of Ohio State University, who

worked out the now-famous "flash system" of instant recognition whereby cadets are taught to recognize a plane or ship, not by an analysis of its parts, but by the whole configuration. The Army sent a number of officers to Ohio State University to learn the method and later established its own teacher training school of recognition at Orlando, Florida, where approximately three hundred officers were taught this new method. Though this was by far the best method of teaching aircraft recognition devised up to that time, the instructors did not sit back and rest on their laurels. When they found changes necessary, they introduced them. Similar changes in methods of teaching have been adopted in other courses.

The challenge in this is that "sacred cows" have no place in an educational system in the Army. Mistakes are immediately costly. The pilot's inability to recognize in a matter of seconds a friendly plane may mean the loss of life and equipment. The pilot's ignorance of storm warnings in the sky may lead to unpleasant and dangerous flights. The pilot's failure to learn the characteristics of his plane may lead to a serious accident. The difference between civilian and army philosophy on this point was aptly put recently by an officer at the Central Instructors' School, as follows: "Any college or university today selects instructor personnel on the ability to teach a subject, which entails adequate knowledge of how to teach, but certainly a history student will not 'spin in' if the instructor has forgotten to mention the War of 1812."

IN the pre-Pearl Harbor days, when time seemed so plentiful, candidates for pilot training were required to study mathematics because algebra, geometry, and especially trigonometry were considered prerequisites to the study of navigation. The importance of these subjects to the study of navigation was stressed time and again by educators in the classroom and at meetings of the learned. The truth is that, except for some very elementary concepts of algebra and geometry, a pilot can learn to navigate to the farthest reaches of the earth without mathematics. Recently the writer was in a navigation class in which a navigator was explaining a dead-reckoning problem in celestial navigation. He put a form on the blackboard, filled in the spaces with numbers selected from a table, and added or subtracted as was required by the form. After the navigator was through explaining how easy it is to find one's position by celestial navigation, someone asked him if he had used logarithms in his computations. The navigator answered, "I don't know. I do remember that the instructor at Navigators' School told us that these were logarithms."

There is no attempt in this recital to belittle the importance and value of a knowledge of mathematics in the development of the science of navigation. No one who has studied navigation, even superficially, can fail to realize how much of the science depends upon mathematics. The point that is being stressed is that mathematics is not a prerequisite to the study of navigation as pilots, or even navigators, use it in planes today.

Similar comments can be made on the scientific background essential to the proper understanding of meteorology, aero equipment (engines and fuselages), theory of flight, and weights and balances. Each of these subjects can be made a life study; yet pilots must be taught enough of the fundamental principles of each in a year to operate successfully powerful tactical aircraft. The exigencies of war have compelled

Army educators to simplify these subjects so that men with little more education than one or two years of high school and a minimum of physics can learn the principles which will enable them to pilot planes. Elaborate mathematics and science prerequisites cannot be honored. The enemy will not wait on us.

Again, for the sake of emphasis, it is repeated that no attempt is made to underestimate the importance of the natural sciences in the development of these subjects. In fact, it is only fair to state that the instructors to teach these subjects were carefully chosen because of their scientific educational background and teaching ability and then were sent to highly specialized schools conducted at the leading universities of the country before being assigned. The instructors were required to have the essential physics and mathematics prerequisites.

THE courses, and on a larger scale, the educational system of the Armed Services must fit the needs of the situation. Preconceived notions or *a priori* judgments concerning the length or the content of a course in a curriculum must yield to rational study based on the requirements of the end to be achieved and on the capacity of the students to absorb the knowledge. In general, courses are short. Where public schools speak of weeks and months, the military schools deal in hours.

The war cannot be won by raising "so-called standards" so that only a few select students can meet them. Nor can it be assumed that any particular educational philosophy is beyond critical analysis. The writer recalls an educator's statement immediately after Pearl Harbor that the educational philosophy of the institution with which he was associated should not be changed because of the war since that philosophy had been in operation for a long time. It was this sort of intransigence that caused so much grief to many of our educational institutions.

Much discussion has been aroused during the past few months over the plan announced by President Hutchins of Chicago to lower the age at which students are admitted to college. It is the writer's belief that such a trend is a likely prospect for the future. If youths of 19 and 20 can be trained to assume the responsibilities of officers with command functions, they certainly should be able to undertake many of the responsibilities in civilian life. No doubt the extent of the opportunities available will influence greatly the school period in the postwar era, but the results of the military experience indicate that age in itself should not be the important factor in determining the selection of college students.

In considering the influence which Service educational training will have on our public schools, we should remember that graduates of Service schools do not "commence" to look for jobs; the jobs are waiting for them. The disillusionment which confronted many graduates of the public schools is absent in the military schools. Although a comparison between the two on this point obviously is unfair since the public schools do not have the control on selection and placement of students that the military schools possess, nevertheless the effect of this factor may be pronounced in the minds of these men. Many of them will return to school at the close of hostilities, and at the completion of civilian training they will expect the same easy transition from school to job. Or they may expect it for their children.

NO attempt has been made, for obvious reasons, to evaluate critically the pilot ground school educational system. The purpose of this paper is to pick out those features of the system which appear different from the common public school practices, and which may have some influence on postwar educational thought.

The schools with which this writer is familiar have progressed a long way during the short period of their existence. They have avoided the stratification resulting from crystallization of program. They have maintained a fluid condition. From the beginning, the importance of teacher training has been recognized, and every effort has been made to secure the best instructors in the field and to make available general and specialized schools for the improvement of teaching techniques. The most phenomenal progress has been made in the development of training aids, such as mockups, drawings, films, film strips, and mechanical devices such as computers, cutaway models of instruments, engines, and fuselages.

When the Army selection program has been analyzed adequately, our guidance experts will have a wealth of data, techniques, experimental research, and methods of application upon which to base similar research and which can be used as a starting point for more extensive investigation. Not only has the Air Forces worked on the selective procedures, but it also has undertaken research to determine the effectiveness of these selective techniques by evaluating the end-result in actual practice.

Of great social significance will be the fact that an adult educational program was developed on a truly universal scale. Thousands of men and women have learned for the first time that purposeful education is not alone for the young, that age is no barrier to knowledge, that education does not require formal prerequisites such as are commonly found in many of our civilian institutions.

War Has Little Effect on Stanford Grades

Except in the cases of a few individual students, the impact of war on American college youth has not caused any appreciable change in scholarship averages, according to a study of Stanford students' grade averages for the past twenty-four years recently completed at Stanford under the direction of Registrar J. P. Mitchell.

In spite of students' increasing their course load beyond the usual fifteen units and attending classes throughout the year without the three months' summer vacation, grade averages for both men and women increased slightly after Pearl Harbor.

Evidence of possible influence of the war in development of certain extremes in scholastic achievement was seen in an increase in 1942-43 over the pre-war year of 1938-39 of 1 per cent in scholastic deficiencies at the lower extreme and an increase of 3 per cent in the number of students at the top who achieved a B average grade or better.

One explanation offered for the students' apparent ability to carry more courses and still do better work was that the war has made most students more serious, while only a few students have relaxed into an "eat, drink, and be merry" attitude.

How the WAVES Train Their Storekeepers

By ALICE L. DEMENT

THE second largest group of rated women in the Navy are the wearers of the crossed keys—the storekeepers—the largest group being the yeoman. Storekeepers of the Women's Reserve of the United States Navy are trained at Indiana University and at Georgia State College for women. In the former institution, the instruction is given by civilian business instructors; in the latter, by rated men and women, storekeepers of the United States Navy.

A storekeeper in the Navy is really an accountant. He, or she in this case, records the purchasing, the storing, and the issuing of all supplies from complete airplanes down to buttons. She is responsible for the computation and recording of pay and for the disbursements of funds. In eleven weeks of instruction the trainee must learn to perform these duties. The training given her in preparation for the job is vocational training in its most specific definition.

Classes meet for seven hours and thirty minutes daily, with morning, afternoon, and night sessions. The week's schedule begins Sunday night with study hours and continues until Saturday noon, when the school recesses for the week-end.

THE educator who makes a careful study of procedures in the Navy storekeeper's schools will be impressed primarily by the following observations:

1. Materials are presented at a highly accelerated tempo.

2. The motivation of trainees is exceptionally strong.

Our schools have much to learn from the various Service training programs. For example, from the training of storekeepers for the Women's Reserve of the United States Navy, as the author of this article points out, we learn two lessons: (1) the importance of well-defined goals, and (2) the important contribution of a powerful motivation.

Lieutenant (j. g.) Dement is in the Standards and Curriculum Section, Training Division, Bureau of Naval Personnel, Navy Department, Washington, D. C. Her present duties require her to make a special study of all curriculum and instruction problems arising in the training schools of the Women's Reserve. She has just completed a tour of all the yeoman's schools and promises to report on her findings in a later issue of the "Journal." Lieutenant Dement is on leave from the Los Angeles City College. At the time she entered the service, she was coördinator for the Aptitude Testing Project in Semiprofessional Education being carried on in that institution.

The tempo, of course, is not suited to the abilities of the group, but rather to the needs of the Navy. Those trainees who cannot keep up to the pace after a reasonable period of time are sent out as seamen on general detail, or, if more promising, they may be kept on until the end of the course and sent out at seamen strikers for storekeeper's rating. Under such a set-up a most astonishing amount of material is covered in a mere eleven weeks. The results accomplished are made possible by two existing fac-

tors: (1) the definite vocational goal to be achieved, and (2) the high degree of motivation trainees bring with them.

Many of the objectives of the normal educative process are scrapped for the duration in this kind of teaching. The Navy school is not responsible for the trainee's enjoyment of the course. Whether he is thinking, or reacting, or growing, is beside the point. Truth of the matter is that many trainees probably are confused for the first few weeks. But the motivation is sufficient for most trainees to keep them struggling at top speed.

Individual differences are submerged, and individual instruction is practically nonexistent. Here, you see, the shoe is on the other foot from where we have thought of it as being worn in our recent educational experience. In the Service, it is expected that any pronounced individual differences in abilities or interests should have been identified and accounted for in the selection of the girl for the type of training for which she is sent, for standardization is the aim both in the instruction and in the product.

Many of the practices arising from the necessities of emergency conditions are not to be thought of as permanent or of any lasting value.

The emergency has enforced procedures, however, from which we may make some observations admitting of broader application.

The challenge to the teacher takes very definite form. He knows the Navy must have storekeepers. He has the raw material before him, presumably capable of becoming storekeepers. The rest is up to him, or he is falling down on his war-time job. His attention is directed constantly to the end-product he must train. He sees before him the trainee as she is and knows the standard set up for the rating for which she is to qualify at the end of her course. Each hour's allotment of material is planned in full. If one-half hour is lost or used ineffectively, the goal cannot be reached. There is never one moment lost for raising the question, "What shall I teach now?"

Not only the course content taught but the motivation is largely provided ready-made. Few girls join the Service today who have not either a friend or relative being subjected to danger in the combat areas. One WAVE has had five brothers killed in combat. One has a son participating in the Pacific action as a gunner's mate 2c. People who are as emotionally near to the war fronts, as are most of the girls who enlist, are not going to contribute anything less than their best.

Many times instructors at Bloomington have made such comments as, "We have only to keep out of their way." Trainees have ten minutes between classes at Indiana University, but many times they arrive early in the classroom and have the day's work under way before the instructor arrives. Such eagerness certainly supplies the stimulus to keep the instructor on his toes. Many of the teachers comment on the difference between these and civilian classes in the matter of seriousness of attitude.

INTERESTING studies have been carried on in the storekeeper's schools for the purpose of isolating factors which seem to correlate most highly with success in the training. Students are segregated into groups according to typewriting ability, based on the results of entrance-timed writings. Classes range from students having no typing ability to those having a relatively high straight-copy speed. Trainees highly skilled in typewriting, as shown on their entrance scores, have consistently made the highest marks in all areas of supply

and disbursing. The level of arithmetic achievement, also, has been found to be highly predictive of success in the storekeeper's course at Indiana University.

Other factors proving significant in prediction are previous work experience in related fields and technical training for business positions. Although the age range of women trainees is 20 to 36, no relationship has been found to exist between age and achievement. This conclusion differs from that arrived at in research based on trainees at the Toledo storekeeper school for men. The age range there is much greater, however, and it was the 17- and 18-year-olds whose age seemed significant as a negative factor.

QUITE definite implications may be interpreted for the public schools from the experiences encountered in the Navy storekeeper training program: For one thing, the importance of well-defined goals to economical and efficient use of time in the educative process; for another, the power of emotional motivation in enabling students to achieve the impossible within well-defined time limits.

More definite information coming from an analysis of job standards undoubtedly could point up vocational education in the public schools more effectively. More clear-cut thinking on the part of instructors in general education in regard to desirable obtainable goals and the length of time justified for their accomplishment might likewise produce more effective teaching.

The important observation that may be made regarding motivation is the efficacy of tying in each segment of instruction with the larger picture to which it contributes. Vividness in the presentation of the ultimate aim, and attention to the arousal of the student's imagination in the direction of visualizing the importance of this aim, might contribute much to the drive behind his efforts.

It has been said that the average person perhaps uses about one-fourth of his potential abilities. The necessities of the war situation have caused most Americans to rise to a productive peak representing far more than the usual used portion of their potential capacity. The challenge to education is to discover how to keep this present drive in operation for the more effective accomplishment of peace-time goals.

Junior Colleges Furnish Service Personnel

Approximately one-fourth of the faculty members in the 600 junior colleges of the country have left their positions to engage in some type of distinctly war service, either with the armed forces or in a civilian capacity, according to an announcement from Walter C. Eells, executive secretary of the American Association of Junior Colleges. This estimate is based on reports received from almost half of the junior colleges, employing a total of some 7,000 faculty members.

Reports from the same institutions, far from complete, indicate that at least 300,000 of their students and graduates are now serving in some branch of the Armed Services.

The best proportional record for faculty service comes from the junior colleges of California where 33 per cent of the faculty have left for war-time service. Other sections of the country report as follows: Pacific Northwest, 25 per cent; Southern states, 23 per cent; North Central, 22 per cent; New England, 20 per cent; Middle Atlantic states, 18 per cent. The total number of faculty members who have left their institutions for war service is in excess of 3,000.

World-Wide Schooling for Soldiers

By KENNETH E. OBERHOLTZER

Since the Army Institute (later to become the United States Armed Forces Institute) was first announced, school people have been intensely interested in it, for its relationship to upper secondary and higher institutions is most direct. Through the Institute, members of the Armed Forces continue their education by correspondence and individual study, and through it also educational institutions will be able to secure an evaluation of the military man's service training as an aid to their interpretation of such experience in terms of academic credit. This article and the one which follows give a rather complete picture of the work of the Institute.

The author of this article, a lieutenant colonel in the United States Army, is superintendent of the Long Beach City Schools, on military leave. He is a member of the staff of the USAFI and has played an important part in its rapid expansion.

THROUGH the United States Armed Forces Institute and the Army Education Branch, Morale Services Division, the War Department has made extensive arrangements for soldier educational opportunities. Officers and men stationed both within the continental limits and overseas are continuing their studies in a most gratifying manner.

From points all over the world, letters have been written to the Institute showing that the men want to continue their education while in the Army. For example:

Staff Sergeant Arthur Davis of a weather squadron writes to explain a delay in submitting his correspondence lessons, "However, now that all the Japs here are dead ones, and we are getting lights, I have started reviewing my lessons and will send No. 3 to you as soon as possible." Another soldier writes, "This makes the second time I am writing for material due to a little bad luck. The first time it was a ship sinking that caused me to lose my material. This time it was a couple of bombs that caused me to lose what I had. I carry the textbooks in my bag and it was destroyed." Sergeant William P. Busch writes appreciatively, "I shall be indebted to the USAFI for enabling me to finish my high school education and graduate, even though I have been out of school for thirteen years."

SOON after the declaration of war the War Department established the Army Institute (later designated the United States Armed Forces Institute) at Madison, Wisconsin. This War Department agency is the official institution for provision of a number of educational services, set forth in Army Regulations, some of which will be described briefly in this article. In addition to the Institute at Madison there have been established, in all of the principal theaters, branches of the Institute for the purpose of rendering these educational services overseas quickly and efficiently. Supervising the planning and developing of this educational program is the Army Education Branch, Morale Services Di-

vision, of the War Department. Civilian educators will be interested no doubt to know that the supervision of this program is a chief responsibility of Colonel Francis T. Spaulding, on military leave from his civilian duties as dean of the School of Education, Harvard University.

It is impracticable to attempt a comprehensive description of the institute's educational services in this article; consequently only a few of them will be described. At present the Institute is concerned primarily with voluntary educational opportunities which are to be afforded soldiers during off-duty time (in contrast with required training during duty time). In connection with these opportunities it is well to note briefly two major objectives:

1. *To enable military personnel to become more efficient in their Army jobs through profitable use of off-duty time in appropriate educational activities.* Most of the present off-duty educational program is designed to supplement the Army training program.

2. *To help military personnel prepare for their return to civil life.* Although soldiers are interested primarily in their responsibilities as members of the Armed Forces, there are occasions when it is appropriate for them to think of their return to civil life. We know that they do think about this. Consequently, an obligation rests upon the Army to make it possible for them, while they are in the Service, to continue some school courses and other educational interests studied in civilian life, so long as this will not detract from their military efficiency.

CIVILIAN educators would be amazed to see the conditions under which soldiers study in their off-duty time. These conditions vary all the way from the most modern Army schoolrooms in the rear areas to stone huts under enemy fire near the front, from large camps within the continental limits to isolated outposts in the jungles overseas. Wherever the Army mail goes, there one will find usually some evidence of the Institute activities.

Because of this great variety of conditions under which instruction is offered, the Army has developed educational materials and services which differ from usual civilian school situations. For example, the rapid change of soldiers from place to place, the distance from main supply bases, and the frequent absence of teachers competent in the various subject fields have made necessary the extensive development of both correspondence and self-teaching materials.

The Institute was concerned initially with providing suitable correspondence courses that would have a direct bearing on increasing the efficiency of the soldier. These courses were made available at first on a noncredit basis only, and the soldier was charged a $2.00 registration fee as evidence of serious intent. Some of the courses included were Automobiles; Diesel Engines; Elementary Electricity; Bookkeeping and Accounting; Trigonometry; and English Grammar. At first the correction of correspondence lessons was accomplished through arrangements with the University of Wisconsin, but the rapid growth in enrollments made necessary additional arrangements overseas through educational institutions located near branches of the Institute.

Following the provision for these noncredit correspondence courses offered directly through the Institute, arrangements were made with a number of colleges and universities to provide both high school and college correspondence courses on a credit basis. For courses taken directly with one of these coöperating colleges (with enrollment through

the Institute) the soldier pays one-half and the Government one-half the cost. A great variety of courses is offered by this means.

Descriptions of correspondence courses (and other educational materials) available to soldiers are given in the second edition of the *United States Armed Forces Institute Catalog,* which is being given wide distribution in the Army. Copies also are available to schools if a request is made of the Commandant, United States Armed Forces Institute, Madison 3, Wisconsin.

The popularity of correspondence courses with men and women in the Armed Forces is shown by an enrollment of over 100,000, with a monthly enrollment increase of about 15,000.

In order that another means for individual instruction might be provided, a civilian editorial staff has been employed to develop materials for self-teaching courses, available for individual study as an alternative to correspondence courses. These courses are developed from existing civilian and military textbooks and adapted especially for individual study in military situations. Among their features are the following: use of military language and illustrations; questions or problems for study; keys or answers; review exercises and other study devices; paper-bound and, generally, pocket-sized books. These courses have been very popular with soldiers and have been used both for individual and group study. One of the most popular titles has been "English Grammar"; another has been "Review Arithmetic." Although these courses undoubtedly would be of interest to civilian educators, they are not now available for civilian use.

While individual instruction materials have been stressed, extensive provisions have been made also for group instruction materials available without cost to the soldier. A great variety of paper-bound textbooks is distributed from the Institute at Madison and from the Branch Institutes located overseas. Such titles as "Radio for Beginners," "Improving Your Reading," "Crop Management and Soil Conservation," "Business Principles and Management," "Psychology and Life," and "Healthful Living" are now available as Education Manuals (textbooks) for off-duty time classes. These textbooks are reprints of popular civilian textbooks, paper-bound for convenience of distribution.

FOR a number of reasons the Army has been interested in soldiers' having some facility in the spoken language of the countries to which they are going. In order that this might be achieved, printed language guides and recordings have been produced under direction of the Army Education Branch.

One type of these materials is relatively brief and elementary—consisting of two double-faced phonograph records and a language guide for each language studied. The records give first the English equivalent and then a phrase in the foreign language spoken by a native speaker, with a pause each time while the learner repeats, imitating as closely as possible the pronunciation and intonation of the speaker. By listening to the records six or seven times, the soldier can learn to understand and pronounce all the phrases. At the same time he learns exactly what sounds the letters of the simplified, phonetic spelling stand for, and is in position to use the additional material at the back of the language guide. This additional material, which is not on the records, consists of some more useful phrases and of a number of "fill-in" sentences containing blanks and a list of key words which can be put in the blanks.

Approximately the same printed material is available for some languages in

a series of Pocket Guides to foreign countries which are prepared by the Morale Services Division. In some other languages, in which demand is small, records are available with mimeographed texts instead of the printed language guide or Pocket Guide.

In addition to these elementary materials the Army has provided more comprehensive and advanced materials which require many hours of intensive study and practice.

Some detail has been given here in the case of the elementary materials because the study of foreign languages on this level and in this manner has proved to be highly effective and popular. In contrast with the usual civilian school study of foreign languages, the Army has emphasized brief, intensive study of the spoken language rather than extended study of the written language. The materials described here are not available for civilian use.

WITH the establishment of the United States Armed Forces Institute there quickly arose the question of whether and how those completing courses through the Institute should receive academic credit which would be recognized by schools and colleges. It became apparent also that service in the Armed Forces involves many other educational experiences from which important educational values may be derived. Such experiences include the basic training given all soldiers, specialist school training, and various informal educational activities. It is obvious that to a very great extent these experiences may constitute the educational equivalent of some of the courses that would have been taken by soldiers had they remained in school or college. In justice to these men and women, it is highly desirable, accordingly, that some plan be provided whereby they may, upon their return to school, secure such advanced standing as properly recognizes the genuine educational value of these experiences.

Such considerations led to the development of a plan of accreditation whereby appropriate examinations assaying their educational experiences may be administered to men and women at the time of discharge or demobilization from the service. As one part of the examination program, the Institute has prepared a battery of tests of general educational development.

The first purpose of these tests is to help the schools and colleges ascertain the level at which students returning from military service are capable of carrying on successfully in a program of general education. These tests of general educational development will be supplemented by special proficiency tests which may be used to evaluate the more specialized or the more technical and vocational types of educational experience that the individual may have had while in the service. A second purpose of all these tests is to enable the returning student to secure due credit (academic and otherwise) for those experiences gained in the Armed Services which make a genuine contribution to his general or specialized educational development.

It should be noted, however, that the Institute will not specify nor recommend the amount of high school or college credit that should be granted. Rather it will report to the schools the individual scores on the examinations, together with appropriate norms for their interpretation, and the schools themselves will decide independently how they will use the test results in the granting of credit.

In addition to the use of examinations and the reporting of examination results for accreditation purposes, the Armed Forces Institute will assist individuals by assembling from all available

official sources full descriptions of their educational experience and attainments while in the Armed Service. Those descriptions will include pertinent data regarding specialist courses taken in service schools and qualifications in any pertinent duty assignments. Schools and colleges, as well as a great many national and regional accrediting associations, have recognized and endorsed the Armed Forces Institute accreditation plan.

QUESTIONS pertaining to accreditation and requests for examinations should be referred to the United States Armed Forces Institute, Madison, Wisconsin. Requests for information should be addressed to the Commandant, United States Armed Forces Institute, Madison, Wisconsin. Some interesting general information on accreditation is given in a pamphlet entitled *Earning Secondary-School Credit in the Armed Forces,* published by the National Association of Secondary School Principals of the National Education Association.[1]

If the reader should have occasion to counsel men or women in the Armed Forces, he should advise that accreditation service is available only to individuals who specifically request it. Application may be made to the United States Armed Forces Institute, Madison 3, Wisconsin, on a form called "Request for Report of Educational Achievement."

The materials and services described here do not constitute a complete picture of what the Army is doing for officers and men in off-duty education, but perhaps they are adequate to show that the Army is interested in providing world-wide opportunities for "continuing educational opportunities" and for enhancing "the value of Army personnel as citizens upon return to civil life."

1 Washington, D. C.

College of the Pacific Summer Session

Two special educational workshop projects highlight the College of the Pacific Summer Session program at Stockton, as announced by Dr. J. Marc Jantzen, dean of the School of Education. Dr. Earl K. Peckham, director of the Junior Red Cross in the Pacific area, will conduct a two-week workshop in the Junior Red Cross in the classroom, extending from July 10 to 21; while a group of Pasadena educators will guide a three-week project on The Eight-Year Secondary School from August 7 to September 1.

These features come within the two complete five-week general summer session periods, which run consecutively from June 26 to September 1.

Since the 6-4-4 school organization pattern is receiving increasing attention as a desirable plan in communities where a junior college is a part of the public school system, the Pacific School of Education has designed the secondary workshop to evaluate education in the years comprising Grades 7 through 14. Dr. J. W. Harbeson, principal of the Pasadena Junior College, will present the philosophy of the eight-year secondary school during the first week of the workshop. Andrew P. Hill, superintendent of the Stockton school system which recently has adopted the 6-4-4 plan for its future pattern, will serve as the workshop coördinator.

During the second week, curriculum problems of the eight-year secondary school will be attacked under leadership of a school administrator yet to be named. The third week will be devoted to educational and vocational guidance functions and will be directed by Dr. Margaret E. Bennett, director of guidance for the Pasadena city schools.

In addition to the specialized developments in the education field, courses will be offered by fourteen departments during the twin sessions. As much as twelve units of upper division or graduate credit may be earned in the two periods.

Service Education and the Junior Colleges

By W. T. BOYCE

THE United States Armed Forces Institute is the major agency of the educational department of the Army, Navy, and other branches of the Armed Forces. It is located in Madison, Wisconsin, in a three-story building formerly occupied by the Montgomery Ward Company. The administrative staff, of some twelve officers from ensign to colonel, is composed of former educators. Colonel Francis T. Spaulding, dean of the School of Education, Harvard University, on military leave, is the chief officer with headquarters at Washington, D. C. Some one hundred enlisted persons, including WAVES and WACS, are employed.

The twofold purpose of the United States Armed Forces Institute is, first, to make available educational opportunities to men and women in the Armed Forces, alike in America and abroad, including those in enemy prisons; and, second, to assist soldier students, who successfully complete the courses it offers, to obtain credit toward educational goals, secondary or collegiate.

Under the dynamic leadership of Colonel Francis T. Spaulding and his staff, the educational program that is developing is destined to have a far-reaching influence on American education and on the citizenship, knowledges, skills, and culture, which are the effective results of all educational endeavor.

THE program of education administered by the Institute is carried on during off-day time by correspondence and self-teaching. In each case the initiative is taken by the person in service. He hears about the opportunity and applies for information. The answer is, in part, mimeographed material concerning courses, costs, and procedures. In addition, the applicant receives a personal letter as direct and specific as the questions asked will permit. Throughout, the service proceeds on a strictly individual basis. Many letters may be exchanged before the prospective student is ready to make a choice of sub-

The preceding article described the activities of the United States Armed Forces Institute, as they are seen by a member of the military staff of the Institute. This article by Dr. Boyce considers the work of the USAFI from the point of view of the layman and discusses the implications which the Institute program and other types of Service education have for the junior colleges. The two articles taken together give a good picture of correspondence education for the military and answer many of the questions which school people have been asking in this regard.

Dr. Boyce has been dean of Fullerton Junior College since 1918, this making him in point of service the oldest dean, director, or president of a junior college in California. He has always been active in organizational activities of the junior colleges and at present is chairman of the committee appointed by the State Department of Education to report at the recent Bakersfield junior college conference on standards for accrediting junior colleges in California.

ject. The case may require letters to the last school the applicant attended and also to some one or more colleges and universities whose correspondence courses are being considered. Information and advice are given freely, but the choice always is left to the applicant.

The Institute catalog lists some eight hundred courses, soon to be expanded to approximately one thousand. Some seven to eight hundred of these are offered by the eighty coöperating colleges and universities. The Institute itself has developed and described forty-some courses and is about ready to increase its offering by some two hundred additional titles.

The quality of education obtainable in this as in all other programs is and must forever be relative. It depends quite as much on the adequacy and reliability of tests as upon the range and usefulness of course content. That correspondence courses offered by cooperating colleges and universities are of good quality can be taken for granted. It is not likely that the great educational institutions will permit their names to be connected with inferior courses of study. The testing and grading of such courses is done by the teaching staff offering the courses. This is an added assurance that good standards will be maintained.

But what of the courses offered by the Institute? First, it is interesting to learn that courses purchased from certain correspondence schools in the initial stage have been revised and, presumedly, improved. Courses recently announced and now under construction are the product of the Institute itself, worked out either by members of its staff or by educators employed for the purpose. Furthermore, and this seems most important, the Institute employs the testing bureau of the University of Chicago to make tests for its various courses. The bureau has developed also general educational tests to determine levels of accomplishment for men in the service who feel that they have advanced educationally through observation and experience. Furthermore, the Institute has a contract with the University of Wisconsin to read and grade test papers.

These methods of course building, testing, and grading would seem to assure not only a fair standard of work, but the absolute impersonality of declaring results. All the customary grade levels from failure to the highest achievement are declared. Whether or not any attempt is made to distribute grades according to the curve of probability is not known to the writer. It should be added that all test papers are returned to the student. Tests are coming in for grading at the rate of seven to eight thousand a week.

Developments in the Armed Forces Institute have great significance for the junior college, but enumerating implications is much like describing the size of the moon. It is a matter of personal opinion and happy guessing. It would be idle to assume that the tremendous educational program that the Armed Forces are directing will make no imprint whatever on junior college education. The direction and extent of that imprint is where the uncertainty lies. It is the purpose of the following discussion to venture some predictions of the effects on the junior colleges that will flow from the educational experience and experimentation that now is in process on a large scale.

AFTER the war, individual study under faculty direction will be extended to the junior college level. Results from correspondence and self-teaching courses are revealing that the general population has a capacity to learn in independent nonclass study far beyond what heretofore has been thought possible. It has been assumed

that only a few highly selected students in a comparatively narrow range of subject matter could obtain satisfactory results in nonclass procedures. Now, individuals by the thousands apparently are mastering the essentials in such difficult fields as chemistry, physics, mathematics, electricity, psychology, and foreign languages. If the secret is in motivation, it well may be that the situation in which young America finds itself will furnish the motivating factor.

It is not to be assumed that formal class-laboratory-studio-shop work will be superseded by some detached mass supervision process. In the atmosphere of the time-honored procedures in school and college, there are intangibles which are not likely to be disregarded in future education. It is to be assumed that more emphasis will be placed on independent study and that the range of studies may be expanded greatly in any junior college having a teaching staff of scholarship, experience, and creative ability, meaning that courses will be pursued under faculty direction by individuals and small groups who do not meet in formal class sessions.

Already the publishers are announcing self-teaching texts. Extreme statements have been made. Mr. Sidney James French, coördinator of the Naval Flight Preparatory School, is quoted as saying: "This work has shown me that prewar—liberal arts—college education was a leisurely way of killing four good years in a young man's life." And Dr. Samuel N. Stevens, president of Grinnell College, is on record as saying: "Soon, in one semester of college preparation, we'll do as much for any gifted student as normally is done in four years of high school." Perhaps the "gifted student" is the way out on this prediction. At any rate, we have been aroused to a sense of new possibilities in the acquisition of knowledge, if the tools are suited to the needs.

A FORTHRIGHT guidance service will need to be developed in every junior college. Guidance as a function of education has been widely recognized, and the tools of guidance have been steadily improved. Now come new and important advances in the field. Industry, organized labor, the Veterans Administration, the United States Employment Service, the Armed Forces, have set up guidance services. The Armed Forces are using some two hundred aptitude tests, many of which have been newly devised. The impact of this extensive addition of the guidance function on the junior colleges is inevitable.

The guidance function should be all-inclusive. Vocational guidance in the terminal field in postwar education will take on a new meaning because of the accelerated advance made in industrial technology during the war and because of the many new areas of training which have been described in textbook form. But guidance also is important for the academic student and for the discovery of academic aptitudes as distinguished from the technical or applied type of aptitudes. Education, training, placement, promotion, success on the job, attitude, and social competency all are in part conditioned upon the individual's making the right choice of work. A misfit in economic activity is ill-suited to contribute significantly to the moral and spiritual influences on which civilization is grounded. No one tool is needed so greatly in the junior colleges as some dependable finding system for potential aptitudes and capacities for rather broad fields of the world's work.

AN enormous improvement is being made in defining and describing training for technical areas of industrial employment. Many types of work are being opened to training which were never before included in any course of study. From the experience gained in

preparation for many specialized jobs will come definite units of study and training to be incorporated into more general fields.

In this there may be danger along with the advantages. One danger is that we shall enter upon a cycle of curriculum planning that will overfractionalize the subjects taught and that will tend to disparity rather than unity and integration. There also is the danger that we shall be so impressed by the wealth of useful subject matter in terminal technical courses that no time will be left for the general and liberal arts type of subject matter. The world of tomorrow will make demands which will require a new sense of social responsibility, a new understanding of freedom, and a new liberation of the human spirit. Moreover, these demands will extend to a far larger per cent of the population than the small per cent who attend liberal arts colleges. Yet, another reason for including some general and liberal arts subjects in each two-year curriculum is found in the practical results of such training as shown by many studies. These studies indicate that some general education content in a technical program better prepares the learner for promotion and for adjustment to new situations. If this is the case, we had better make our technical programs broader, not narrower.

INDUSTRY and business may share in vocational training to an extent not heretofore contemplated. Before the war, and currently, training on the job coördinated with institutional education, to some extent, as credit for work experience, apprentice training, the staggering of work and formal studies, distributive education under the George Dean Act, passed by Congress in 1936, and possibly other types. Experience in two directions during the war may foreshadow a wide extension of such practices. First, the war industries have been forced to organize training programs in the plant for new recruits and for the upgrading of older employees. Apparently the results have been most satisfactory. It has been shown that technical skills can be developed quickly on the job, particularly if the candidate has acquired a reasonable amount of basic training. Second, it has been shown that the knowledges which are required in connection with skills can be described in textbooks and lesson sheets in terms that can be mastered in individual study.

Another factor enters the situation. Credentials, certificates, diplomas, and degrees have acquired a new significance. Every young man in the service has become aware of the great value of the secondary school diploma and the college degree. The application of work under the United States Armed Forces Institute toward the fulfillment of requirements for a diploma or degree is a motivating force second only to the desire to gain the knowledges and skills, the purpose for which the courses are mainly intended. Consequently, in the future, accreditation will be sought for every bit of vocational training for which recognition can be obtained.

The result well may be that a very much larger part of the educative process of a vocational type gained through employment will be applied on school credentials. This means that a new, direct, and simplified set of connections between the schools and industries should be made. And it means, too, that much of the necessary training for the world's work may be pushed out beyond the walls of school shops and laboratories and become more realistically connected with the tools and machines of industry in daily productive operation than heretofore has been thought possible.

Teaching Mathematics for The Million

By FRANK N. FREEMAN

ONE of the outcomes of the war, in the opinion of many officers of the army and navy and of many observant laymen, is the revelation of gross inadequacy in the teaching of mathematics in the public schools. The experience of the armed forces, and of industry, is supposed to have shown that vastly larger numbers of students should study mathematics and that they should study more mathematics—up to and including trigonometry. We may look, therefore, for a campaign, after the war, to require the study of mathematics through trigonometry by a large share of high school students. If such a campaign is launched, it will grow out of an idea that is about as sound as the belief that the psychological tests given in World War I showed 40 per cent of the male population to be morons.

The reasons that no such conclusion follows from the experience of the army and the navy, not to speak of industry, are, first, that the demands of the services in war time are no reflection of their demands in time of peace, and, second, that the number of men who need straight mathematics to perform the duties required of them is much fewer than has been implied by the published statements.

To say that the schools should, in peace time, give all the preparatory training that may be needed in time of war is like saying that industry must be kept in continual readiness to produce 10,000 planes a month. Again, the number of men who acquire techniques in the army or navy which are based on mathematics is vastly greater than the number who are required to understand the principles of mathematics and their application. The same is true of industry. The implied statement that all the men in the armed forces and

During recent months, the Board of Education of San Francisco has been considering the recommendations proposed by a survey of the elementary curriculum as organized in the city. In the course of the discussion, a member of the Board raised the question of whether the fundamentals are being given the proper attention in San Francisco elementary schools; and so Dean Freeman, who had directed the survey, was called in to explain his attitude and that of his associates with regard to the manner of teaching the 3 R's and the broader question of what are "fundamentals." A nationally syndicated columnist picked up the discussion and in many of the larger papers throughout the country gave his attitude toward the teaching of the fundamentals. The article included herein, while not prepared as an answer to the columnist, does give an excellent statement with regard to the teaching of mathematics, and it furnishes Dean Freeman an opportunity to state in some detail his position with regard to this particular "fundamental."

Dr. Freeman is dean of the School of Education at the University of California, Berkeley. He came to California in 1939 from a professorship at the University of Chicago. Probably he is best known for his work in the field of educational psychology, one of his most important studies being an analysis of the effects of environment on the intelligence of foster children.

industry who perform technical operations require a knowledge of higher mathematics for such performance is the wildest exaggeration. The war does not teach that mathematics through trigonometry is a practical necessity for a large proportion of men, let alone women. The question of the kind and amount of mathematics which is good for the average person and should be an element in general education still remains open.

Some years ago Professor Hogben wrote a best seller called *Mathematics for the Million*.[1] Because this title suggests that mathematics for the great majority of people may not be the same as the mathematics for the specialist, and because Professor Hogben puts forth some very sensible ideas on the place of mathematics in everyday life, I have borrowed his title for the theme of my paper. I shall also quote some of his cogent statements.

Let me repeat that I am not here considering mathematics as a basis for the study of physics or engineering or chemistry, or even for technical work in the army, the navy, or industry. I am expressing no opinion concerning the kind of mathematics that is best for these purposes. I am neither saying that mathematics as now taught is the best kind of mathematics for engineers and scientists and technicians or that it is not. To escape the pretense of being omniscient I must draw the line somewhere, and I draw it here. I am not an engineer or a physical scientist, and I cannot see, therefore, the needs of engineering and science from the inside. However, I am the product of general education, such as it was, and I think, therefore, that I may venture to cast a critical eye upon it.

I am sure that my alert readers have charged me already with ignoring two important objections to making the distinction between mathematics in general education and mathematics as a preparation for certain learned professions. I assure you I have not forgotten them. Now is the time to meet them.

The first objection may be expressed in the question: How can we run one kind of program for the prospective scientist and engineer and another for the million? Let us turn the question around. How can we justify imposing on the million a program that is designed for 1 per cent? The question seems to answer itself. Of course we do not know just who will compose the 1 per cent at the time they are in high school. Very well, let us play safe. Let us encourage any who may conceivably be pointed toward the professions requiring a formal and rigid training in mathematics to take this training. This may take in, say, 5 per cent. That should provide a margin of safety.

As I have said already, I am officially treating this preprofessional training in mathematics as something sacred and not to be touched by profane hands. I cannot resist the temptation, however, to remark, quite off the record, that I think it possible that even this program might be modified slightly in the direction which I am about to suggest for the training of the million. In fact, I would even venture to suggest the remote possibility that a common foundation might be laid for both groups, with differentiation occurring somewhere along the line. I know, of course, of the experiments in unified mathematics and am not, by this tentative suggestion, passing judgment on any particular scheme.

The second objection is more fundamental. It is the contention that any distinction between the two classes of students is beside the point, for the reason that what is good for preprofessional students is good also for the

[1] Lancelot Thomas Hogben, G. Allen & Unwin, Ltd., London, 1936.

million. It is good for a different reason—not because it gives command of techniques and operations that will be of use in professional activities, but because it trains the mind. In other words, it is contended classical mathematics is good for the million as well as for the specialist because it provides intellectual discipline.

The appeal to formal discipline as a justification for holding a place in the curriculum is the last refuge of a bankrupt subject. For a subject to lean on formal discipline lays it open to the grave suspicion that it has nothing else to lean on. When teachers of mathematics or teachers of foreign language give prolonged attention to the question of mental discipline, as in the 1923 *Report on the Reorganization of Mathematics in Secondary Education*,[2] it shows that they are not sure of the specific and direct values of what they are teaching.

There is no debate about the commonsense view that if we learn to perform a particular operation we may use that operation in a great variety of situations. Even this is not inevitable, since it may not occur to us to use an operation in an unfamiliar connection. Transfer of this type is perfectly feasible, however, and not too difficult to make. It is this sort of transfer which should be cultivated and for which the teacher of any subject should prepare.

The kind of discipline which is dubious is that which consists in the cultivation of abstract intellectual powers, such as the power of judgment, the power of reasoning, or the power of logical thought. I would not deny that anything of this sort occurs. I do hold, however, that when this is made the chief aim and justification of a subject the outcome will be very meager. The very setting up of discipline as the goal cuts the taproot of effective intellectual effort, which is the attempt to solve a real problem.

I AM interested in discrediting this spurious aim of teaching mathematics because I wish to substitute for it one that is much more solid and substantial. It is true that less emphasis is put on discipline as an outcome than formerly, for the war emergency has reawakened our recognition of the direct value of mathematics. In periods such as this it is not felt necessary to fall back on the shaky support of discipline. I am afraid that this broken staff has only been laid aside temporarily, however, and that it will be brought forth again when the armed services and industry slacken their demand for our product. What I wish we might do is to throw it away altogether and learn to walk without its aid.

In order to do without the crutch of mental discipline, we must develop and use the real and direct values of our subject. The reliance on discipline is a mode of escape from the pains of studying the place which mathematics holds or may hold in our life and thought and of deriving a curriculum and teaching procedure which comport with this place. If we could establish the central place which mathematics holds in life and thinking and if we could realize it in our teaching, we should never need to trump up extraneous reasons for the existence of the subject. This, however, is not merely a matter for argument. It is a matter of creative effort. It is not a question of the place which mathematics actually holds, merely, but of the place it might hold. In order that it may hold the place that it is capable of holding, it needs to be organized and presented differently from how it has been done in the past.

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[2] *The Reorganization of Mathematics in Secondary Education*, report by the National Committee on Mathematics Requirements. The Mathematics Association of America, 1923; p. 89-104.

THIS brings me to my main theme, which may be put in the form of two questions: first, what is the place of mathematics in life and thought? and, second, how should it be organized and presented so that it may occupy this place? These two questions are, in reality, inseparable, for if mathematics is an integral part of the life of society and the thought of the individual it must be taught in intimate association with the rest of the curriculum.

Back of these questions is the idea that mathematics may and should have an intimate place in our common human life—that it is not something apart, mysterious, esoteric. If we may believe Professor Hogben, the history of mathematics shows that it has developed, not as an independent manifestation of intellectual creative endeavor but as a means of meeting concrete human needs. He says:

> Some people will tell you that mathematics did not begin until there was a class with leisure to play with figures and numbers. Later on we shall find abundant evidence for the view that mathematics has advanced when there has been real work for the mathematician to do, and that it has stagnated whenever it has become the plaything of a class which is isolated from the common life of mankind.[3]

Hogben's whole book is an argument for this thesis, supported by a wealth of examples.

I SHOULD like now to develop what seem to me the implications of this point of view for the teaching of mathematics. I do not mean to imply that they are new. It seems clear, however, that they are not accepted wholeheartedly as the basis of the planning and procedure in mathematics. There is still a large mixture of traditional procedure based on the idea that mathematics is a self-contained discipline, having incidental applications to be sure, but not an intimate part of the warp and woof of human thought and action. Its influence on thought is commonly regarded as taking place through the transfer of powers developed in the realm of mathematics over into other realms of thought rather than in the development of mathematical forms of thought in everyday thinking itself. The contrast is a bold one and should be sharply conceived. If the conception here advanced is accepted, it will require a radical overhauling of the subject of mathematics as taught in our schools.

I should like to advance a statement of the point of view in question in a series of propositions which together may be taken as a platform for the reorganization of the teaching of mathematics in general education. Here they are:

1. *Only that mathematics is important for general education which the individual will use.* This is the contrary proposition to the proposition that mathematics is of value to general education for the discipline it gives, the correctness of which proposition I have already denied. I here give the positive proposal as a substitute for the one I have criticized. The principle of discipline lays chief stress on form and ignores the importance of content. The principle of use places content in the position of dominance and treats form as the means of making content effective.

Form without content is sterile. A literary period in which writers become preoccupied with the way they say things but with nothing burning on their minds to say is a decadent period. Similarly, an educational program which relies on mental gymnastics to develop powers of the mind, instead of presenting the student with vital tasks and problems and letting him develop his intellectual muscles by performing real work, is putting the cart before the horse. It will produce pedants rather

[3] *Op. cit.*, p. 36.

than scholars, dilletantes instead of workers of the world. It is the product of a period in which education has grown out of touch with reality and is more interested in preserving its inherited privileges, perquisites, and procedures than in being a vital factor in advancing the common life of mankind to new levels of attainment.

2. *The individual will use only those mathematical ideas and operations which he has learned by or in use.* Perhaps this statement is a little too strong. It is better to overstate, however, than to understate it. It is so much easier to teach things in the abstract than to develop them in connection with meaningful situations that we need continually to remind ourselves of this danger. If we find that we are failing to give sufficient attention to the systematic or theoretical aspect of mathematics, we can proceed to correct that failure. This danger, however, is not the one to which we are most inclined or to which our traditional practices predispose us.

Let me stop at this point for a moment to explain what I mean by use. In later paragraphs, the meaning will become clearer. I should like at this point, however, to anticipate some objections that otherwise might set up resistance to the trend of the discussion—genuine difference of opinion I expect and accept, but difference of opinion based on misunderstanding I should like to avoid. Please note, then, that by use I do not mean either actual use or explicit use that can be identified easily.

For example, I think that the job-analysis type of study which was initiated by Wilson[4] in the attempt to discover what topics should be included in the course of study in arithmetic was inadequate. I do not say it was of no value, but it was inadequate in two respects: First, it gave no means of finding processes which might well be taught but are not; and, second, it was not calculated to uncover those modes of thought or concept which may be produced by the study of mathematics but which do not appear as easily identifiable operations. We need to broaden rather than to narrow down the range of concepts and operations. What these are we shall probably have to discover by a subtler type of analysis than the usual type of job analysis.

3. *The individual will actually use only those processes that he has mastered and made thoroughly familiar to himself.* This is the principle of thoroughness or, in technical, psychological terms, of overlearning. Hogben makes a statement with which mathematicians may not agree, but which I think deserves careful consideration. He says:

> Although algebra, trigonometry, the use of graphs, the calculus, all depend on the rules of geometry, scarcely more than a dozen from the two hundred propositions of Euclid's elements are essential to help us in understanding how to use them. The remainder are complicated ways of doing things which can be done more simply when we know later branches of mathematics. For the mathematical technician these complications may provide a useful discipline. The person who merely wants to understand the place of mathematics in modern civilization is merely distracted and disheartened by them.[5]

If this is true, what a pity it was not discovered sooner. Think what pains and heartaches, what agony of sweat and tears it would have saved. Careful selection of processes, operations, and concepts and abundant application, use, and illustration comprise the method that will bear later fruit.

The next statement concerns the relation of use to understanding. I venture this formulation of that relation:

4. *Understanding is desirable, but it comes best through familiar use first,*

[4] G. M. Wilson and the Connersville (Indiana) Teachers, *Connersville Course of Study in Mathematics for the Elementary Grades* (revised). Warwick and York, Inc., Baltimore, 1922, p. 112.

[5] *Op. cit.*, p. 26.

and formal explanation afterward. How commonly we follow the opposite order of procedure. We are so obsessed with what we think is the logical arrangement that we set things out, not in the natural order in which human beings learn them, but in the order that we lay out after we have made an analytical study of what we learned long before.

This is illustrated in language—to turn the spotlight for a moment on another subject and relieve us from the strain of self-examination. When a child acquires his native language, he learns to speak first and studies the structure of the language second, if at all. If he has had good models and judicious and sympathetic criticism, he gains thereby such command of the vernacular for purposes of thought and communication as his intellectual equipment permits. But how do we proceed to teach him a second language? We start with the structure, teaching him rules of grammar, conjugations, declensions. He comes out with a certain amount of knowledge that he can display, but not with a language that he can use. The armed forces are now teaching foreign languages by the natural method and are finding it more effective. It is to be hoped that we do not forget the lesson when the war is over. We might well set up a rule: No explanation until the student has had a wealth of experience with what is to be explained. Even then we should proceed cautiously to be sure that he is not becoming confused, getting out of touch with reality, and accepting words—not to express meanings but as a substitute for them.

The relation between use and explanation is somewhat like the relation between discovery and proof. We overemphasize the technique of proof in all our education, including mathematics, to the neglect of the technique of discovery, which is equally, if not more, important. We can prove things only after we have discovered them, and frequently the effort to prove them is of very little value. We do not need the proof to convince ourselves, and we do not succeed by our efforts at proof to convince those who have not made the discovery for themselves. I am pleased to find Hogben holding this view—which I have long presented to my classes—in the following words, "Mathematical truths are usually discovered by *experimenting* with individual cases first and *'proved'* afterwards. The proof is then an obituary notice on a praiseworthy statement."[6] This is true in other fields as well.

The illustration of language is more than a remote analogy. It leads us to the next proposition:

5. *Mathematics may properly be thought of as a language—that is as a particular set or particular sets of symbols which represent special aspects of reality.* Words stand for objects and relations. In so doing they enable us to hold these objects and relations in thought, stand off and view them, and manipulate or play with them. They also, of course, enable us to communicate our ideas of them to others. Numbers and other mathematical symbols represent particular kinds of relations, such as position in a series (the ordinal idea), multiplicity of objects each treated as a separate entity (the cardinal idea), size or amount represented in abstract units, the ratio and proportion of amounts expressed in quantitative terms, and so on. These and other symbols which are familiar to mathematicians constitute the vocabulary of the language of mathematics.

All this is familiar enough, and, in fact, commonplace. There is one point, however, which is not so familiar. The average person, I believe, has an in-

[6] *Ibid.*, p. 88.

adequate conception of what language means for thought. In this common conception, a person first has an idea and then he learns a word or other symbol to express the idea. It would be more correct to say that, by and large, the person comes into contact with the word and that this contact with the word creates the idea. Of course, in the race, words and ideas had to grow up together through long centuries of cultural evolution. In the mental development of the individual, however, the acquisition of ideas is very largely brought about by learning to understand and use words.

Take an illustration from a common noun—any common noun, say, *tree*. If you should ask the ordinary person how he came to have the idea, *tree*, he would stare at you in total incomprehension of what you were driving at. We commonly take a word like *tree* as a matter of course and similarly take the idea of a tree as equally a matter of course.

If we watch the child in the process of acquiring word meanings, we see that this matter-of-course-ness is simply a forgetfulness of the long course by which we acquired such a commonplace. We can get a little touch of reminiscence of the experience by asking ourselves exactly what we mean by a tree. Just what is the difference, for example, between a tree and a shrub or a bush? Just what growing plants are to be included? The older person has narrowed down the zone of uncertainty between such common concepts and has filled in the class idea with a rich variety of particular objects. He has done this as a result of hearing the word *tree* applied over and over again to a variety of objects, of applying it himself, sometimes correctly and sometimes incorrectly, and of being corrected in his use of the word until his idea has become sufficiently clear that he knows how to apply it. Thus, the process of acquiring words promotes, and largely creates, the development of ideas.

The same thing holds for number. Mankind had no idea of number until it had developed words to express number, and the long and slow evolution of this development is pretty well known. The progress in operations with number was conditioned also by the development of convenient forms of number notation. It is our good luck, for example, to have inherited the decimal system, though it would have been still better if we had inherited a duodecimal system. We may well be grateful for what we have and congratulate ourselves that we do not have to calculate with the clumsy Roman systems.

From this discussion we may formulate the conclusion:

6. Mathematics is, or contains, a form of language which formulates and defines the quantitative aspect of experience and, therefore, stimulates and largely creates quantitative ideas and forms of thought.

The manner of acquisition of this language of mathematics and of the corresponding ideas follow very closely the manner of acquiring words and ideas in general, so far as fundamental number ideas are concerned. The child usually knows the number names up to ten or beyond when he comes to school and may know some of the simpler combinations. He acquires these by the natural means, that is by frequent use in concrete situations. When he comes to the formal study of mathematics in school, however, this natural process is left behind. As a result, the symbols and the operations which are conducted with them lose their meaning and come to seem to him a sort of hocus pocus. The notion that the mathematical operations have any connection with the world of reality is farthest from his mind. When he does have such a notion it may be quite quaint, as in the case

of a youngster who said that an average was something that hens laid eggs on. We conclude, therefore:

7. To have meaning in the thinking of the child, or of the ordinary person in general, the use of the mathematical symbols and operations should be developed in intimate and continual association with the real world of experience.

Let us take the concept *average* as an example. I venture to say that the arithmetical process of calculating an average is taught as a relatively mechanical operation before the idea of average is developed to a corresponding degree and that the process of calculation is introduced in such a way that it does not serve to clarify the idea but rather remains aloof from it. In other words, the child retains a hazy notion of the average which persists to adult life. This hazy notion contains an admixture of the different types of averages—the arithmetic mean, the mode, and the median—and this admixture produces vast confusion of thought.

For example, most people probably think that the average income of Americans represents the typical income. This, of course, is a grievous error, one which may have serious political implications. Put in statistical terms, it arises from the ignorance of the fact of the skewed distribution of incomes and of the relation between the mean and the mode in skewed distributions. If a full opportunity to deal with averages of various sorts in a wealth of concrete situations were given, so that the ideas of the meanings of these sorts of averages could emerge, and if the processes of calculation kept pace with the development of ideas, mathematics would be a much more vital factor in the life and thought of the individual.

The mathematics which is taught and learned as a series of manipulations of a set of signs, following certain rules, and without close relation to the things signified, is not the mathematics for the million. It may be suitable for the specialist who is interested primarily in advancing the science of mathematics, or for the youth with a special flair who enjoys mathematics as a game, but not for the vast majority. To put it positively:

8. *The mathematics for the million is that which gives clearer and more effective ways of thinking about the real world of experience because it has been developed out of this world of experience.*

I WOULD that I could illustrate more fully how these principles could be worked out in the various levels and branches of mathematics and could say just what they would mean for the organization and methods of instruction in mathematics. Let me say again that I realize that what I have said is not new. What would be new, I believe, would be a system of instruction based on it. Perhaps this cannot be done; such a scheme might be impractical. I believe, however, that we might well go much farther in the direction of such a plan than we have gone thus far. This would mean freeing our minds much more from traditional organization than we have done, and in particular developing the concepts and procedures of general education much more consistently than we have done. The teaching of mathematics apparently has been revitalized during the past two years by the emphasis placed on it by the armed forces and by industry. This, I believe, is not a true revival. It is a shot in the arm which will keep us stimulated while the war lasts but will leave us without any real new life.

The belief that a large percentage of people in normal times needs the kind of mathematics we teach is an illusion. In fact, I have some doubt that it is what

the army and navy need, in large numbers. I am sure it is not what the average civilian needs. What he does need is something that will interpenetrate and reorganize his whole system of thought.

What then do I suggest? I suggest the same procedure that I would suggest to other fields of study. Mathematics is no exception in its need of reexamination. The entire fields of the natural sciences and of the social sciences are just as much in need of it. Physics and chemistry and biology and history and economics and political science are taught as specialized bodies of knowledge without specific reference to the information about the world and the ways of thinking about the world that are necessary to make the average citizen an educated person. What I say to teachers of mathematics I say to all teachers. In fact, many are saying it to themselves. The substance is this:

Lay aside for the moment your preconceptions. Ask yourselves this simple question: "What does a person need to know, and what ideas and techniques does he need to have to enable him to understand and behave intelligently in the modern world?" This means the common knowledge and understanding of the bulk of the citizens, not of the specialist. We then would approach our respective subjects, not by asking, "Is my subject of some value?" but by asking, "Is it of most value possible?"

I think we should ask ourselves the question: What ideas and processes of a quantitative nature are basic to living intelligently in the modern world and are capable of being incorporated into the structure of thought and behavior?" I fancy we would find these ideas and processes to be somewhat fewer than are commonly laid out in our programs of instruction.

A SINGLE illustration may make clearer the procedure I have in mind. A well-known device of today is the public opinion poll. I am sure this is quite a mystery to the ordinary man. Why, for example, the Gallup polls are so amazingly accurate and the last *Literary Digest* poll was such a tragic failure is quite beyond his comprehension. Mathematics teachers, of course, know that the answer lies in the sampling procedure followed in the Gallup poll and not followed correctly in the *Literary Digest* poll. They know also that sampling is based on the mathematical principle of proportion. But how many pupils who have studied proportion in arithmetic have ever been led to develop the concept of proportion so that it functions in the various relations in which it belongs?

How many persons realize instantly, for example, that it is fallacious to compare the number of accidents in airplanes, railroad cars, and automobiles directly, but that they must be compared only in proportion to the passenger miles of the three modes of transportation? Simple, you say. Yes, but more vital to the million than quadratic equations or the demonstration that only one perpendicular to a straight line may be erected from a point on that line.

The mathematics for the million is not that mathematics which is learned as a game or as a task and which remains as an isolated series of ideas or of operations. It is a mode of conceiving and of thinking about the world, a kind of language, which transforms the whole mental life. In order that mathematics may become an integral part of thinking, those parts must be chosen which thus can be incorporated, and they must be used with something like the pervasiveness with which ordinary language is used. When this is done, the common man will become fit in mind to cope with a scientific and technical age in which quantitative relations play so large a part.

A Changed Emphasis for Music Education

By CHARLES M. DENNIS

ONE of the natural by-products of a war seems to be the urge to fix the blame on someone or something. Hindsight comes to the aid of innumerable critics; and military, economic, political, and educational should-have-beens are lovingly furbished and exhibited. Our schools, in all fields and on all levels, have been the recipients of some lusty though poorly aimed kicks. Much of this criticism is hardly valid; the sudden discovery that our country has not been training its youth to wage war successfully is a reflection upon the discoverer. Education for war has never been an objective in our system. It is equally true that the procedures of quick learning under penalty of knowing or dying are not usable under normal conditions.

Any evaluation of subjects made during a period of national peril cannot help but be weighted on the destructive side. It is inevitable, nevertheless, that subject fields be analyzed during a period of crisis, and music educators have not been lacking in initiative or honesty in examining the product of their efforts.

Several things become apparent to the investigator. The fighting man with musical talent is more valuable for having this ability. His contribution to recreation for his fellows frequently is of great importance. The individual soldier's ability to participate in singing or other musical activity is a resource which adds to his value. Madame Chiang made the following statement while on the Navy launch which brought her from Oakland to San Francisco in March, 1943:

Curriculum workers during recent years have emphasized the importance of integrating all aspects of the secondary curriculum so that they will work to the common purpose of producing a well-rounded individual. Many of them have insisted that instructors of special subjects have a contribution to make to general education and that it is important for them, therefore, to reach as many students as possible. Most of us have agreed with this contention in theory, but too often we have not been able to put it into practice. Sometimes teachers of social studies, English, or other core subjects have been unable or unwilling to work with the specialists; and far too often the specialists have been interested only in individual or group performance. This being the case, the present article by the director of music in a large city is very significant, and the fact that the Music Educators National Conference has taken the action reported herein takes on added importance.

Mr. Dennis is director of music in San Francisco. He also is a member of the Board of Directors of the Music Educators National Conference, chairman of the Editorial Board of the "Music Educators Journal," and chairman of the national Committee on Senior High School Music Curriculum Revision. Before going to San Francisco, he had been a member of the music staff at the College of Pacific for eighteen years, serving for most of that time as dean of the conservatory.

Whereas most Occidental races depend on outside motivations to build up a soldier's spirit, the Chinese soldier takes with him into

the field his flute, his mandolin, and songs. With these he entertains himself, thereby keeping up his morale.

The relaxation through music achieved by leaders such as Air Marshal Tedder and General Spaatz has been well advertised, as has the fact that one of our leading air aces—Joe Foss—played in his high school band. Through the Music Educators National Conference, school music teachers have been urged by military leaders to prepare prospective inductees by having them learn a number of songs and to play pocket instruments such as harmonicas, ocarinos, and so on.

THIS form of functional music is quite far removed from what have become accepted objectives in secondary school music and indicates the need for a reëvaluation on that level. A committee of the conference selected from various sections of the country and representing both public and private schools studied the situation and prepared a report for the St. Louis meeting of the Conference, a statement which was both radical and challenging and one which, rather strangely, aroused little opposition.

The Committee believes that secondary music teachers have become so involved with the training and performance of the talented minority that we have overlooked the more general music interests of the remaining majority of less talented but equally deserving pupils. We do not favor any decrease in standards of performance or repertoire already established, but we do urge our profession to broaden its viewpoint as to the real function of music in a democratic and educationally sound high school program.

We feel we must relate our subject to the general educational plan and not maintain an aloof attitude that continues to label us as special subject teachers. We must teach music as a fundamental part of our American way of life so that when our pupils graduate they will have the resource of their musical interest and experience to add stability and enrichment to their everyday life experiences. The high school music program must be shared by all and not subsidized as a luxury subject for the selected few. Our administrators, school boards, and communities must be led to see that in music we have a basic and deep-rooted cultural expression that can strengthen and vitalize the spiritual, emotional, intellectual and creative capacities of all our people.

THE most significant advances in senior high school music have been in the performance area. Precision of ensemble, authoritative interpretation, quality of repertoire, and individual skill have been stressed to such good effect that the best American high school instrumental and vocal groups can stand comparison with professional organizations. Even though a small percentage of our students in these organizations become professional musicians, the training they have experienced is of a type which equips many for music as a career; consequently, whether we intend it or not, a large part of school music activity has been in the vocational field.

The exigencies of public or large private school organization impose definite limitations of program, unit costs, teacher-load, and so forth, on all subjects. Moreover, the higher type of training expected of school music teachers stimulates the tendency toward advanced materials and performance. Competition and school pride may be credited also with forcing the standards ever higher. Inevitably the less exciting musical activities have been given less time and attention; they have been looked upon only as a kind of apprenticeship; students have been valued primarily from the talent-possession standpoint. The needs of students outside the music department in too many cases have been neglected, overlooked, or ignored.

In the judgment of many, this condition is unsatisfactory from a democratic viewpoint, educationally invalid, socially unconstructive, and musically

short-sighted. From a purely musical standpoint, it has much to recommend it, but viewed in the light of responsibility to the whole community and the life needs of all students, it places music educators in a weak position. While the music program must serve the community's desires, its practitioners are obligated also by reason of training and knowledge to protect the community against unsound educational practices.

In the stress of preparing and performing advanced or showy music for the concert hall or athletic field (inevitable in the case of crack ensembles), we find it increasingly difficult to impart through the music period those by-products which often prove more valuable than the musical training received. Coöperation, tolerance, dependability, integrity, abnegation—qualities upon which our national existence are based, can be practiced and learned in the classroom along with music. The character, personality, and attitudes of the high school boy and girl are indefinitely more important to them and the community than musical skill.

IT is not desirable and perhaps not possible to relinquish to any great extent the advanced position which has been achieved. What can be done is for the music teacher to enlarge his area of interest to include the 80 per cent of the student-body whose needs are not being met at present. Once the obligation to consider them is accepted, ways of doing so will present themselves. The highly skilled groups will fit into their proper functions, the pattern of high school music will become clearer to the general educator, and the music department will find itself in a stronger position because it will have served its clientele better and attracted friendly and often powerful supporters.

To the great majority of the musically nonskilled their musical experience should be primarily an adventure in enjoyment. While there is an obligation in all cultural fields to improve the taste of the participants, in no sense should courses or activities for these students be considered as propaganda for "good" music. It should be recognized that music is to serve the student and not the reverse. This is a shocking philosophy to many music specialists and will not be achieved without open-mindedness and a sincere desire to arrive at the truth. If the student enjoys his musical contacts enough to seek further experiences of the same type, the main objective has been achieved. It is fundamentally important, therefore, that the approach and materials insure a pleasurable reaction.

THERE are several avenues through which the results desired may be reached. Among them are the following:

1. A course, allowing a large registration with some credit given, in which much music of a social type is sung, some records of the standard popular repertoire—including such selections as Strauss waltzes, Danse Macabre, March Slav, and so forth—are discussed and heard, and a general introduction to the recreative values of music is made.

2. Frequent musical assemblies allowing informal singing of national and community songs, stressing the folk songs of our own country—including those now available through the valuable research efforts of such authorities as Seeger, Siegmeister, Niles, Zanzig, Lomax, and others. Appropriate songs of other nations, particularly the Latin American, also should be included. Performance by school ensembles of all types are valuable in providing variety to the period but should never be allowed to become the important element or to cause those not participating to become conscious of the lack of skill in their own efforts.

3. A portion, however small, of each assembly or auditorium program set aside for informal singing of songs known and loved by the students.

4. Stimulating other fields, particularly the modern languages, to use music in their classes. The offer of help by the music teacher

in teaching the music of a period or a people can result easily in music participation by hundreds of pupils outside the music department.

5. A sincere effort to work out methods of integrating music with academic subjects. Musicians who fear that music gives too much and gets too little from such correlation should never lose sight of the fact that many boys and girls hitherto outside the influence of music in school are being reached thereby.

Success in integrating music with other fields is becoming increasingly apparent following a very weak beginning. The author has been particularly impressed with the contacts achieved in the Stockton High School by Miss Virginia Short, teacher of orchestra and theory. In the course of a single semester, in 44 periods, almost 2,300 pupils (only a few of them registered in music) have learned of the part music plays in other fields. Typical classes with which she has worked and the subjects she has handled are the following:

Class	*Subject*
Public Speaking	Demonstration of an Object—The Violin
Commercial English 11b	Comparison of *Idylls of the King* with *Tristan* and *Parsifal*
English 9a	Music Inspired by Greek Myths
Social Studies I 9b	Music as a Vocation and Avocation
Economics 12b	Consumer Buying Problems with Regard to Musical Instruments
Current Literature	Music and Modern Poetry
World History 9a	Music in the Age of Chivalry
Current European History	Effect of Nazi Persecution on Music
European History	Rise of Russian Nationalism
Home Nursing	Music Therapy
Foods	Music for Children and in the Home

Other approaches are numerous, and many new and valuable ones will be uncovered once the problem is recognized and efforts are made to solve it. Treatment will vary with the circumstances.

BASICALLY, the committee recommended that wherever music has evolved into a special subject, taught by special teachers for special pupils, and is considered as a vocation, or wherever the high school music department emulates a music conservatory, to the exclusion of other values, steps be taken to reverse the process. What music can give is too precious to be limited to a few and kept from the many.

Library Association Holds Meeting

The spring business meeting of the School Library Association of California, northern section, was held May 13, followed by luncheon, at the College Women's Club, Berkeley. The afternoon session was a symposium on "Readjustment of War Personnel Into Civilian Life: A Challenge to Libraries," which was held as a regional institute of the Redwood, Portola, and San Francisco Bay Districts of the California Library Association.

Speakers on the symposium panel and their subjects were Dr. Olga L. Bridgman, "How to Recognize and Aid War Neurotics"; a Red Cross field worker, "Men and Women Overseas—What They Read"; Miss Mary Catherine Baker, "Disabled Service Men's Reading"; S/Sgt. Elliott W. Morgan, "What the Army Really Reads and Enjoys"; Joseph A. Belloli, "War Workers' Reading."

Developments in Aviation Education

By CORNELIUS H. SIEMENS

FOR a two-year-old, aviation education has made a miraculous growth. Born a war-baby (but not a child *of* the war), adopted in the name of "preinduction," "Victory Corps," "prevocational," and "vocational," and nursed primarily by the Civil Aeronautics Administration with the cooperative aid of thousands of teachers and school administrators, it bids fair to become a regular member of the family of school subjects from kindergarten to the college level. A Federal official calls aviation education a "public necessity" [1][1]; a professor of education refers to it as the "spark plug" of the entire school curriculum [2]; and a high school student asserts that the course in aeronautics is the "best thing that's happened to our high school since it was built."

FROM its inception the aviation education program sponsored by the CAA, with the support of the U. S. Office of Education and the complete endorsement of the Army and the Navy, has emphasized two main objectives:

1. To make a one-year course in the science of aeronautics available to every junior and senior boy and girl genuinely interested in aviation.

2. To add, infiltrate, or weave into the existing curriculum the various aspects and implications of aviation. This applies to all levels of the school program and to every course and subject that lends itself to developing a general awareness of the age of flight and its significance to everyday living.

[1] Numbers in brackets refer to references in the bibliography at the end of the article.

In January, 1943, the "Journal" published a symposium entitled "Preflight Training in California Schools," and present plans call for a second symposium on this topic to appear in the October, 1944, issue. In view of the rapid developments in this field, however, it seems advisable to present at the close of the current school year a progress report—hence the accompanying article by Dr. Siemens summarizing recent trends.

Dr. Siemens, assistant professor of secondary education at the University of California, Berkeley, is author of the "Aeronautics Workbook" and is a consultant for the Civil Aeronautics Administration. During recent months he has consulted with teachers of preflight aeronautics throughout the State and has conducted summer workshops for groups interested in the field.

During the first year, beginning with the fall of 1942, about one-half, or 14,000, of the high schools throughout the nation fulfilled the first objective in varying degrees. Instead of a one-year course in aeronautics, some schools offered a one-semester course; others devoted one or more units to aviation in the physics, chemistry, or social studies courses; and still others, to circumvent administrative disapproval or to gain proper college credit, bootlegged aviation units and even the entire course under the guise of such academically respectable titles as "physics," "physical science," and even "biology."

Table 1 is a statistical summary and comparison of the results of a study

TABLE 1.—*Number of California High Schools Offering Aeronautics in the School Years of 1942-43 and in 1943-44*

Enrollment of High School	Total Number of High Schools Reported in Directory		Number of High Schools in Directory Listing Courses in Aeronautics				Percentage of Total Number of Schools Listing Courses in Aeronautics	
	Fall, 1942	Fall, 1943	Fall, 1942	Fall, 1943	Number of Schools Discontinuing Aeron(1943)	Net Increase(+) or Net Decrease(—)	Fall, 1942	Fall, 1943
99 or less	52	56	12	14	10	+16%	23	25
100–199	63	58	29	13	9	—55%	46	22
200–299	58	51	18	18	9	0	31	33
300–499	53	50	17	17	4	0	32	34
500–999	71	75	27	48	3	+78%	38	64
1,000 or over	117	107	43	71	3	+65%	37	66
All schools	414	397	146	181	38	+24%	35	45

made to ascertain how many high schools in California offered a course in aeronautics in the academic years 1942-43 and 1943-44. The data were obtained from the *California School Directory,*[2] which lists all of the high schools in the State. To the extent to which schools did not indicate a course offering in aeronautics under such synonyms as "preflight," "preaviation," or "aviation," the table falls short of pre senting the true status. Thus, the data show the ***minimum*** number of schools providing course work in aeronautics, and hence it is safe to assume that the actual number is somewhat larger than shown.

Table 1 indicates that there was an over-all net increase of 24 per cent in the number of schools offering aeronautics in the fall of 1943 over that of the previous year. The greatest gains were made in schools having an enrollment of 500 or over; in this category there was an increase from 1942 to 1943 of 70 per cent. The schools in the enrollment category 100-199 showed a net decrease of 55 per cent. This may be accounted for by any one of several reasons—loss of science teachers, offering the course only every other year, an unsatisfactory first year, scheduling difficulties, and the like. In general, the study shows that the greatest number of discontinued courses occurred among the smaller schools and by far the largest number of new courses appeared among the larger schools.

The results and trend are encouraging when one considers the drop in junior and senior enrollments, the multiplicity of war activities, the teacher shortage, and the lack of aviation equipment, materials, and teacher training—all factors to discourage a school from adding a new course to the already crowded curriculum. It would seem safe to say, since two-thirds of all high schools in the State with enrollments of over 500 added a course in aeronautics within two years, that aeronautics has gained the approval of the curriculum makers and is meeting a genuine interest and need of the secondary student and of society.

With reference to the shortage or lack of training of teachers, the following statement by Dr. Fuller may give hope and encouragement especially to the smaller schools:

> Above all, there must be a spirit of daring and a willingness and determination to succeed. Show us a good teacher with some scientific training and aptitude, a high school principal who is progressive as an educational leader, and a superintendent who really comprehends public policy in these times, and we will see a potentially successful course in the science of aeronautics, even though the

[2] California Society of Secondary Education, Berkeley, California; published yearly.

teacher has no special training in aeronautics as such. We must use such combinations as this after the supply of specially trained teachers is depleted. Such a teacher will succeed if the educational administrators will give him reason to believe that he may be able to succeed and will afford in-service training opportunities. The teacher's realized limitations are likely to make him more effective than his colleague who has grown lazy in his subject and imagines that he already knows all the answers.[3]

Aeronautics as a science course on the high school level has not attained a fixed or standard content. Nor is it hoped that it will. Even the primary goal is different for different localities and under different school philosophies, which is as it should be. Certain trends and desirable guide lines have emerged, however. The combined experiences of the Army and the Navy, the CAA War Training and Aviation Education Services, the teachers and administrators, the curriculum makers, and others have resulted in some suggestions for the teaching of aeronautics. Some of the more important trends and developments follow.

INSTEAD of designing the course in aeronautics to serve primarily as a preinduction or a vocational course, more and more schools are organizing a one-year science course within the framework of general education. Such a course will stress the basic principles of aeronautics, omit the more technical and vocational phases, and include new developments and some of the economic, political, and social implications of the air age. This shift in emphasis, however, does not mean that the course cannot at the same time serve as basic preinduction and vocational training. Furthermore, the larger schools well might add special aviation courses to fulfill the objectives of the technical and strictly preflight groups. It is becoming increasingly evident that the "general education" view of the science of aeronautics has gained the approval of the military, the CAA, and most school administrators.

The general education approach to aeronautics teaching, moreover, allows an easy solution to the prerequisite problem in those schools where high standards were set to "protect" the course and its limited objective. As soon as aeronautics is included among the "general education" courses, obviously, it tends to have very few, if any, prerequisites. Many aeronautics teachers have learned that a genuine interest in aviation together with a willingness to work and an average ability are effective selective criteria. Furthermore, if the secondary schools are to prepare coming generations to live intelligently in a flying world, one general course in the science of aeronautics open to as many students as possible would seem imperative.

The subject matter content also has undergone a definite shift in emphasis, partly because the course has become less technical, but mostly because the strictly physics and mathematics approach to a study of aviation limited the course to a very few of the better students—and even they felt that too much "theory" was emphasized. Many schools have succeeded in dehydrating the course to where only formulas, principles, graphs, charts, and definitions remain. This is what happened in many schools to the course in physics, with the result that before Pearl Harbor enrollments had dropped to a mere 6 per cent of the total high school population. If aeronautics is to function as a live general education course for youth whose eyes are looking into the future and who are eager to learn what aviation is all about, it must be practical, up-to-date, and realistic.

This does not mean that there should not be included enough theory to make the course meaningful and enough

mathematics to insure the development of the basic elementary skills in navigation and meteorology and a thorough understanding of how the airplane flies. Specifically, the trend is toward devoting more time to a study of navigation and meteorology and deëmphasizing the mathematical and technical treatment of aerodynamics. More time is given to a discussion of current events and developments in aviation as well as to the more current, general aspects such as "freedom of the air" and "postwar planning for the air age." In the main, the principle of determining the specific content on the basis of the needs, interests, and abilities of the students should be applied within the framework of the school and course objectives.

OF concern to school administrators and particularly to students preparing for college entrance has been the question of college credit for aeronautics. In the summer of 1943, a survey was made to ascertain to what extent colleges and universities were allowing entrance credit for a one-year course in aeronautics. The attitude of 319 representative colleges throughout the nation is shown in Table 2.

TABLE 2.—*Extent of College Credit Given the Course in the Science of Aeronautics*

	Number of Colleges	Per Cent of Colleges
Entrance credit, no restrictions mentioned	137	43.0
Elective entrance credit	172	54.0
Favorably inclined, but no official decision	5	1.5
No credit given	5	1.5
Totals	319	100.0

It is encouraging to note that after only one year the course in aeronautics has gained recognition to the extent that 97 per cent of a sampling of 319 colleges and universities are allowing it full entrance credit. As the course continues to develop and to establish itself in the family of courses making up the secondary science curriculum, there is reason to believe that aeronautics will merit credit side by side with physics and chemistry.

THE agency most interested and active in developing aviation education in the schools of America is the Civil Aeronautics Administration, and more particulary its Aviation Education Service Division. Working with limited funds, a small central staff, and about twenty educational consultants scattered over the nation, the Aviation Education Service under the leadership of Bruce Uthus has rendered the schools immeasurable assistance and full coöperation. It has adhered strictly to the policy of refraining from selling the schools a set program or in any way "controlling" the development of aviation. In addition to the various textbook, teacher-training, and evaluation projects it has sponsored in the past two years, the CAA Aviation Education Service has sponsored such activities as the following:

The Civil Aeronautics Administration Private Pilot Ground School Examination. The CAA is continuing to make available to high school aeronautics students the examination service of its General Inspection Division. Students who pass one or more of the four fields of the test receive a Certificate of Aeronautical Knowledge. If all four parts are passed, credit is given the student for achieving the knowledge required for the Private Pilot Certificate. If such students obtain proper flight instruction they may qualify for their Private Pilot Certificate. Passing of this test should by no means be the sole aim of the course, but it may well provide an added stimulus and reward for proficiency. It also provides the student with an authentic experience of what kind of information the Federal Government expects him to know be-

TABLE 3.—*Per Cent of High School Students and CPT Students Passing the CAA Private Pilot Ground School Examination*

	Civil Air Regulations	Navigation	Meteorology	General Servicing and Operation	Number of Tests Passed: 1 Test	2 Tests	3 Tests	4 Tests
Per cent of high school students passing	46.8	38.2	28.6	12.1	41.6	30.2	19.8	8.4
Per cent of CPT students passing	55.5	66.5	56.2	44.9	24.3	24.1	26.2	25.4

fore qualifying as a civilian private pilot.

In June, 1943, over 22,000 students availed themselves of the opportunity to take the CAA examination. The results in terms of percentages and a comparison with about two thousand CPT (Civilian Pilot Training) students who took the test in June, 1942, is given in Table 3.

When it is considered that the high schools were offering aeronautics for the first time, with meager equipment and teachers having little or no training, the results, compared with those of the CPT students, should not be discouraging. The trainees of the CPT were college students who had just completed a concentrated course specifically aimed, in the main, at training for the tests. In general, the high school students showed up fairly well.

The highest and lowest scores for the high school students were made in Civil Air Regulations and General Servicing and Operation of Aircraft, respectively. The difficulty in the latter can be explained partially by the fact that existing texts included little about the practical operation of airplanes, but dealt chiefly with the aerodynamic aspects. For teachers who are desirous of knowing or letting their students know the general nature and difficulty of the CAA tests, it is recommended that the five *Coöperative Preflight Aeronautics Tests* [4] be obtained. The coöperative Tests Service also distributes a pad of fifty short unit tests [5] in aeronautics, which were prepared under the sponsorship of the American Council of Education.

Distribution of Aviation Equipment from the Army and the Navy. The CAA has made arrangements with both the Army and the Navy for the release to schools of damaged and obsolete aircraft parts and other materials no longer of military value or which are beyond "economic repair." Everything from complete airplanes to assorted metal scraps has been made available to the schools.

The Army has released quantities of airplane engines, propellers, wings, and complete airplanes, while the Navy is providing, chiefly, instruments, airplane parts, engine parts and accessories, radio equipment, and a wide variety of small miscellaneous items such as plastic glass, bullet-proof rubber gas cells, life rafts, model airplanes, and the like. The two services complement each other, which means that schools should attempt to obtain materials they desire from both the Army and the Navy.

CAA request forms for Army equipment should be obtained from the individual state departments of education. Each of these departments is coöperating as the agency in its state for the

national program of releasing aircraft equipment by the Army.[3] The distribution of Navy materials, on the other hand, is organized on a decentralized basis. That is, the CAA under authority from the U. S. Navy Bureau of Aeronautics has made arrangements with individual naval air stations for the selection and release of aviation equipment. The San Diego, Los Alamitos, Alameda, and Seattle Naval Stations on the West Coast are now supplying materials to the schools.

Because of limited manpower which makes shipment almost impossible, schools nearest each station have been given the first opportunity to request and obtain materials. Other schools in expanding circles about each station will be notified by the CAA educational consultant through the usual educational channels when materials become available. The Navy is making preparations to handle huge quantities of aircraft salvage, and the conservation and salvage officers indicate that more and more materials probably will become available to the schools.

A real challenge exists in the problem of discovering what materials are of true worth to the school program and in learning what are the means and methods by which the greatest educational value can be realized from them. School teachers and administrators should not let this opportunity to enrich the instructional program escape.

Aviation Education Source Book. A project at Stanford University, sponsored by the CAA and directed by Dr. Paul R. Hanna, is preparing for distribution about September 1, 1944, an aviation education source book for the elementary and junior high school levels. The purpose of this volume is to provide a convenient reference source of appropriate and relevant aviation educational material for writers of texts and curriculum makers in the various subjects from the first to the ninth grade, inclusive. Aviation facts and concepts will be correlated with the existing subject matter strands, notably the arts, arithmetic, the language arts, guidance and mental health, science, and social studies. Both subject-matter and activities will be suggested for the various levels, according to subject areas and in accord with established standard curriculum patterns.

This source book should prove to be a decided stimulus for the production of worth-while textual materials, courses of study, and units of work for the elementary and the junior high school program. For it is on these levels that the "infiltration" aspect of the aviation education objective can best be achieved. The timely and natural interests of children can be utilized to do a better and more meaningful job of education; at the same time a foundation will be laid upon which secondary education will be able to satisfy the developing needs and interests in aviation education.

CAA Airport Operations Institutes. Recently, hundreds of administrators and teachers of science were given an opportunity, under CAA supervision, to participate in first-hand experiences at various major airports throughout the nation. Under this program, one-day institutes have been held at Oakland and Los Angeles as well as at other major airport centers. These institutes include explanations, observations, flight experience, and open forums concerning the operation of the weather bureau, the communications center, the airways control center, and the airport control tower. Top-ranking officials of the CAA, which administers and supervises the busy civil and military air traffic, have been generously coöperative in giving their time and energy in making the

[3] In California, write to Frank Lindsay, assistant superintendent of public instruction, State Department of Education, Sacramento.

institutes most worth-while. In California about two hundred schoolmen have had the opportunity through the institutes to observe and learn about the operations, facilities, occupations, and problems incident to controlling and maintaining airports and air traffic. A flight for each of the participants in a relatively small aircraft gave him a realization of the technique, sensation, and three-way movement in man's newly conquered air-ocean.

The need for such an institute is evidenced by the disclosure that about two-thirds of science teachers and administrators attending CAA operations institutes had never taken a flight or at least had not been up within the last ten years. More than two-thirds of the groups had not gone through an airport and observed CAA operations before. Plans are being developed to repeat such educational institutes wherever facilities permit and until all interested teachers and administrators, regardless of school level, have had an opportunity to attend.

State Programs of Aviation Education. Inasmuch as public education in the United States is a state responsibility, it is only a matter of time before all State Departments of Education will come face to face with the problem of arriving at a program or at least a policy regarding aviation education. Several states are now working out such a program. At least one state, Wisconsin, has decided on a definite plan of aviation education from the lowest to the highest grades. [8] At present, the California State Department of Education is setting up a committee whose task it will be to arrive at a set of recommendations for a program of education in aviation suitable for the elementary, junior high, senior high, junior college, and collegiate levels of schooling.

Of definite aid to California schools would be a statement listing the recommendations of the State Department of Education on such matters as (1) the nature and extent of aviation subject-matter and activities to be included on the various levels; (2) desirable and available pre-service and in-service teacher training opportunities; (3) objectives, prerequisites, and content of a course in the science of aeronautics; (4) the desirability and feasibility of offering flight experience or training for teachers and students; (5) a carefully selected and annotated bibliography of teaching materials.

BIBLIOGRAPHY

1. Bruce Uthus, "Aviation Education, a Public Necessity." *The First National Clinic of Domestic Aviation Planning* (Proceedings), Oklahoma City, 1943; p. 203-214.

2. Frank W. Hart, "Education for the Air Age." *The First National Clinic of Domestic Aviation Planning* (Proceedings), Oklahoma City, 1943; p. 213-221.

3. Edgar Fuller, "The Supply of Teachers for Aviation Education." *Education*, 63:91-94, October, 1942.

4. American Council on Education, *Cooperative Pre-Flight Aeronautics Tests* (1. Aerodynamics and Aircraft Structures; 2. Aircraft Engines; 3. Meteorology; 4. Navigation; 5. Radio and Communications, Civil Air Regulations). Coöperative Test Service, 15 Amsterdam Avenue, New York, N. Y., 1943; specimen set, 50 cents.

5. *Coöperative Teaching Unit Tests on Fifty Major Topics in Aeronautics.* Coöperative Test Service, 15 Amsterdam Avenue, New York, N. Y., 1943; 50 cents per pad.

6. Civil Aeronautics Administration Staff, "The Science of Aeronautics in the Secondary Schools." *The Bulletin of the National Association of Secondary School Principals*, 27:3-10, December, 1943.

7. "Education for the Air Age." *The Bulletin of the National Association of Secondary School Principals*, 27:11-21, December, 1943.

8. Committee on Aviation Education, "Aviation Education in Wisconsin Schools." *The Bulletin of the National Association of Secondary School Principals*, 28:13-41, April, 1944.

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